MARCH 20, 1957

electronics

business edition

A McGRAW-HILL PUBLICATION • VOL. 30, NO. 38 • PRICE FIFTY CENTS

CORDINER OF GE: "Advanced weapons require competent maintenance"

NEWS AT A GLANCE

COMMITTEE URGES ARMED FORCES UPGRADE TECHS

(page 30) . . . IRE convention provides peek at future (15) . . . Corporations streamline for growth (13) . . . Deferred pay plans help small firms get executives (17) . . . Highway building boosts computer sales (19) . . . Sunspots harass communications (20) . . . Gimmicks have small effect on tv set sales (22) . . . LIFO helps ease corporate tax bite (5) . . . Electronic air-cleaner business heads for $90 million (40) . . .

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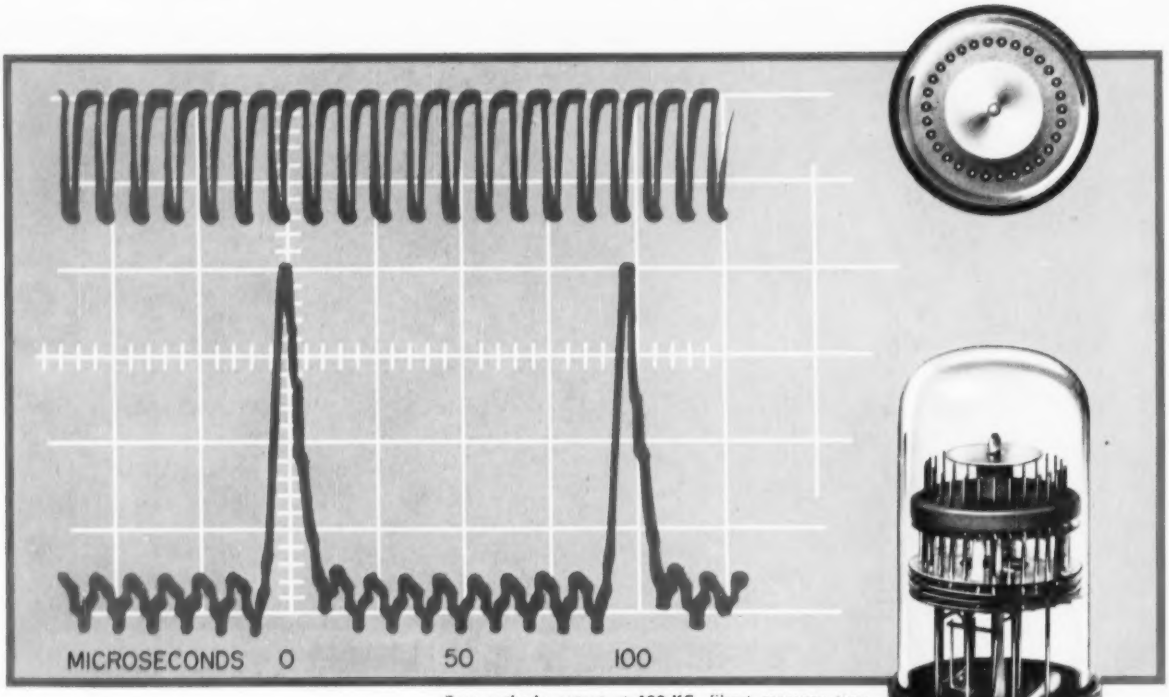
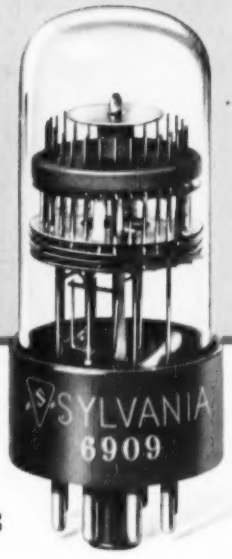
Now—only from Sylvania



Zero cathode output at 100 KC. Short recovery time makes it possible to achieve 100 KC counting speed and respond reliably to random pulses such as those received from radiation detection devices.



NEW *HIGH SPEED* COUNTER TUBES

—wrap 100 KC counting circuits into a single envelope

Sylvania answers the designer's biggest need for high speed bi-directional counting. Now with these 100 KC tubes designers can minimize circuitry in counters requiring multiple stages and re-setting functions, work previously done with numerous vacuum tubes and neon-indicators.

These high speed counter tubes exhibit the same neon glow characteristics as the lower speed types. Thus it is possible to design a 100 KC stage into a counter and retain readout color uniformity on the instrument panel.

And they make it possible to design smaller, lighter, counter instruments at lower cost. Write for complete details. Address Department C20R.

Now, Sylvania is your leading source for both medium and high speed counter tubes

Type	Freq.	Output Cathodes	Base	Min. D.C. Supply Voltage	Max. Anode Current
6909	100KC	4(0,5,8,9)	Octal	400 V.	1.2 ma
6802	4KC	4(0,5,8,9)	Octal	400 V.	0.6 ma
6910	100KC	10	Duo Decal	400 V.	1.2 ma
6476	4KC	10	Duo Decal	400 V.	0.6 ma
6879	5KC	3(0,8,9)	7-pin	320 V.	0.8 ma

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In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

LIGHTING • RADIO • TELEVISION • ELECTRONICS • ATOMIC ENERGY

electronics
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Vol. 30, No. 38

MARCH 20, 1957

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Industry Outlook

SOME PEOPLE who want to use the radio spectrum are still frustrated by the fact that two things cannot occupy the same space at the same time. There just isn't enough spectrum space available.

Every 11 years unusually high sunspot activity makes the situation worse. It is going on right now and there are many cases of interference when signals intended for short-range use go farther than planned.

But there is hope for 4,054 broadcasters, 86,920 two-way radio users, 114,621 aviators and mariners and others jostling for channels.

- **Single-sideband and split-channel operation can help pack more users into bands.**

- **Efficient transmitter antenna design including, perhaps, low-power gap-filler transmitters can make telecasting more universal. Multiplexing, doing yeoman service in point-to-point, may become important in f-m and other broadcast services.**

- **As new radar and navigation systems appear, new frequencies are allocated but the older allocation often remains. Possibly spectrum space for industrial and commercial radio can be found in all-but-abandoned government and other bands.**

Some of the best engineering minds in our industry are hard at work on antenna design, radio wave propagation and narrow-band modulation systems. Perhaps engineers can upset old principles, show communicators still more ways in which two or more signals can, without interference, occupy the same space.

▼

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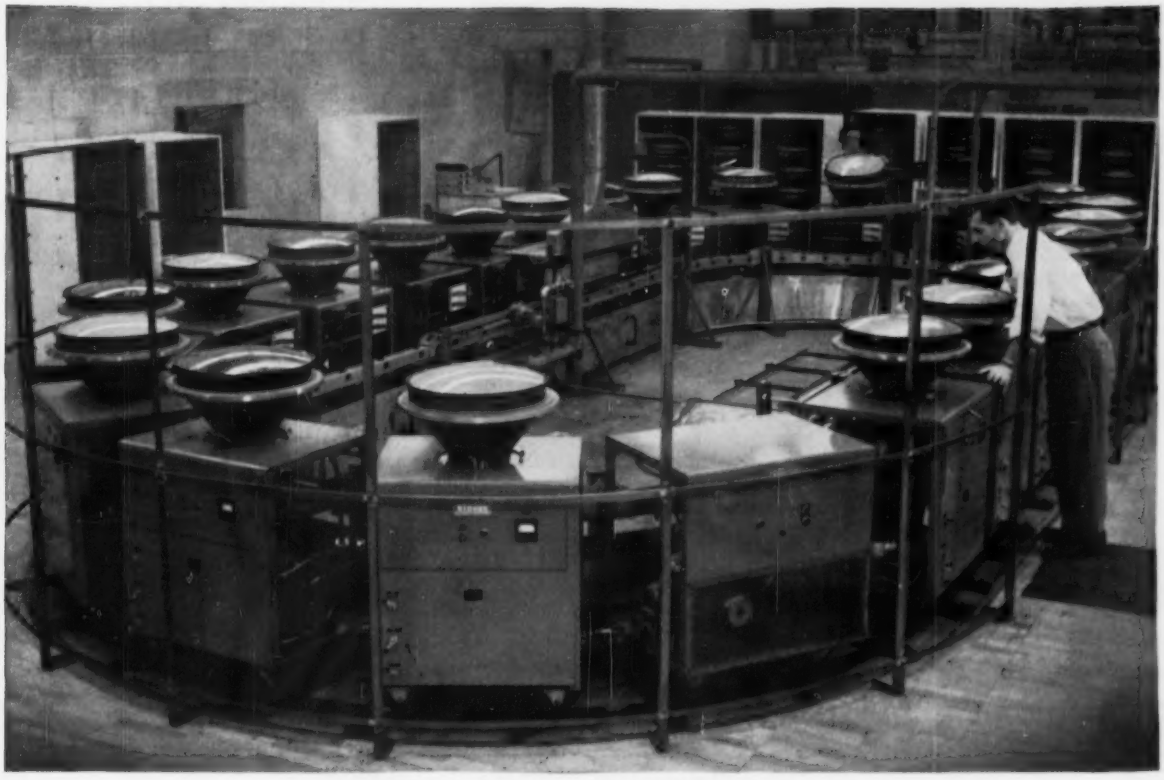

RCA color TV tubes aluminized on Stokes high-production system

First continuous production installation for aluminizing color TV tube face plates is now operating at RCA's Lancaster, Pa., tube plant, using Stokes automatic in-line system.

Application to this unique tube design demonstrates the versatility of Stokes aluminizing systems. They are adaptable to all TV tube designs, for black and white and color, now being used or developed in the industry. They are engineered to provide high output and flexibility to meet changes in production rates and tube sizes.

Systems can be made up of single-tube units, as shown here, or of the exclusive Stokes twin-tube units that aluminize two tubes at a time on each cart. The combination of Stokes high-speed "Ring-Jet" vapor pumps and mechanical forepumps gives rapid evacuation, short cycles and fast production. A complete range of capacities and prices is available.

Specialists in high vacuum engineering and automatic production techniques for more than 30 years, Stokes engineers are well qualified to produce economical, efficient systems for your high vacuum production problems. Write or call Stokes today for a consultation and for literature applicable to your specific field of interest.

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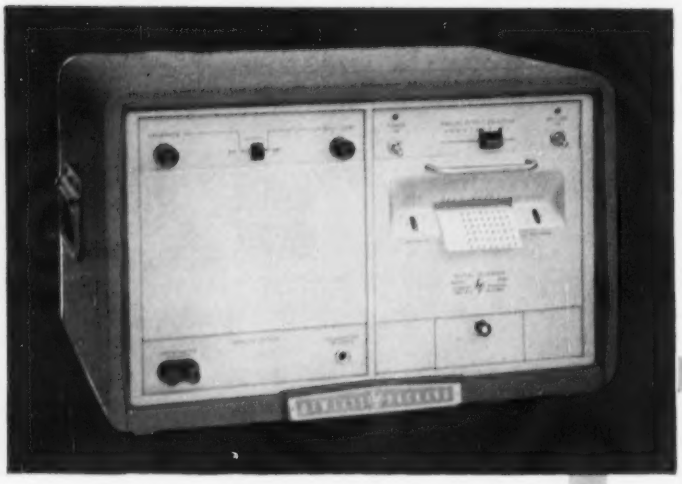


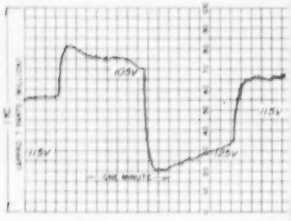
new -*hp*- 560A

DIGITAL RECORDER

Continuous digital record for your frequency counter!

- **Prints 11-digit information at 5 lines per second**
- **Controlled by electronic or mechanical devices**
- **Direct print-out from all -*hp*- counters**
- **Analog output for strip-chart recorder**
- **Expanded scale; full scale can represent $1/10^7$**

Frequency stability vs. line voltage; 150 MC oscillator



SPECIFICATIONS

Accuracy: Identical to that of basic counter used.
Printing Rate: Controlled by counter, 5 lines/sec. max.
Digit Capacity: 11 digits per line.
Driving Source: Parallel entry staircase voltages derived from standard digital frequency counters such as Hewlett-Packard types. Staircase descends from +135 v to +55 v as the count progresses from 0 to 9. Internal impedance of staircase source should be approximately 700,000 ohms.
Print Command Signal: 1 μsec or greater, positive or negative pulse, 15 volts p-p or greater.
Paper Required: Standard 3" roll or folded paper.
Line Spacing: Single or double, adjustable.
Analog Signal: Any three consecutive digits may be selected by selector switch. Output is function of selected digits. For example, if consecutive digits were 3, 8, and 6, output voltage would be 38.6 millivolts or 0.386 ma.
Output Available: 1 milliamp for galvanometer strip-chart recorders. 100 millivolts for potentiometer strip-chart recorders.
Power: 105/125 volts, 60 cycles, 250 watts.
Dimensions: Cabinet Mount: 20½" wide, 12½" high, 18½" deep. (Rack Mount available).
Weight: Net 60 lbs. Shipping 100 lbs.
Accessories Available: 1052-24, 3" folded paper, 48/carton.
Price: Price on request.

Data subject to change without notice

Model 560A is a new kind of continuous duty instrument designed from the chassis up for digital recording of frequency counter output and similar information. It is specifically useful in recording time functions, telemetered data, information to be monitored, tabulated and plotted and system drift phenomena. It is also a convenient digital/analog converter for strip-chart production.

Frequency counter accuracy

Since -*hp*- 560A is a slave to its information source, accuracy is that of the counter or other source. The instrument's motor-driven print mechanism comprises 11 number wheels and associated mixing-comparator circuits. The print mechanism is controlled by a staircase voltage and external print command pulse. The availability of 11-digit lines means secondary or coding data may be printed on the same line as primary data.

Complete details from your -*hp*- representative, or write direct.

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Can LIFO ease tax bite?

Lowers boom-time tax burden
Cuts profit when prices rise
Adds to profit when prices fall

ATTENTION of the electronics industry has been drawn to LIFO (last-in first-out) by recent disclosure that Westinghouse has adopted this method of valuing inventory. As a result the company substantially reduced its 1956 income taxes. LIFO reduces apparent profit which reduces income-tax liability. Net income after taxes was reduced by $12 million in 1956, from $15.5 million to $3.5 million.

The cash conserved by LIFO will be a big help in paying for plant improvements, says Westinghouse president Gwilym A. Price.

Changes in tax laws and liberal interpretations by tax courts between 1938 and 1947 established the right of most companies to pay income taxes based on LIFO computed profits.

The LIFO system eliminates inflation in inventory. Here is the way it works: If prices are rising, ending inventory value will be lower and cost of goods sold higher, thus reducing the net profit figure. However, if prices fall the process is reversed and the profit figure rises.

About 11 percent of the value of inventories of electrical (including electronic equipment) machinery were valued by LIFO in 1951, according to the Commerce Department. This compares with 15 percent for all manufacturers.

Whether now is the right time to adopt LIFO is another question. It depends upon whether the nation is in for an extended price climb or not.

Election of LIFO is simple. Discontinuance requires approval of the Internal Revenue Service.

Who's who in LIFO

HERE IS WHAT some electronics companies are doing with LIFO:

- National Cash: Uses the LIFO method for a substantial portion of domestic inventories. First use of LIFO was in 1951. Value of LIFO inventories in 1955 amounted to $52 million and included raw materials, work in process and finished goods.

- Sperry Rand: About 48 percent of 1955 inventories of Remington Rand division were valued by

SHARES and PRICES

GETTING in on the ground floor of a business destined for substantial growth is a common investment goal. However, getting in on the transistor ground floor is complicated because of the diversified interests of transistor manufacturers.

For example, in the accompanying list General Transistor concentrates solely on transistors, but is already planning to broaden product line. Motorola manufactures transistors primarily for its own use. Texas Instruments is diversified, even though transistor sales are a substantial portion of total sales.

Transistor business is growing in spectacular fashion. Factory sales of $55 million are estimated for 1957 and $150 million by 1960. Transistors sparked a portable radio boom and are widely used in automobile radios. Tv set usage is expected.

The biggest use of transistors to date has been for entertainment. But the greatest growth potential is in industrial and military business, including computers and data processing, missiles, telephone switching and industrial-control equipment.

Transistor Manufacturers	Recent Price	1956 Dividends	Percent Yield	Earned Per Share 1956	Earned Per Share 1955	Traded	1956 Price Range
Bendix Aviation	60¾	2.40*	4.0	5.04 (yr)	5.66	NYSE	48½–64⅜
Clevite	18¼	1.15	6.3	2.15** (yr)	2.54	NYSE	18 –24¼
Columbia Broadcasting A	30¾	0.90*	2.9	2.00** (yr)	1.83	NYSE	22⅝–34½
General Transistor	9¾	—	—	0.46 (9 mos)	d-0.03	ASE	5 –11
Motorola	37	1.50	4.1	4.00** (yr)	4.39	NYSE	37½–51¾
Philco	16⅛	0.80*	5.0	0.21 (9 mos)	2.13	NYSE	16 –36½
Raytheon	18⅛	—	—	0.45 (yr)	1.72	NYSE	13 –19½
Sylvania	40⅜	2.00	5.0	3.23 (9 mos)	4.29	NYSE	42 –55⅞
Texas Instruments	16¾	—	—	0.70** (yr)	0.49	NYSE	11⅝–18⅜

* plus stock dividend, ** estimated, d-deficit

LIFO. Value of LIFO inventories amounted to $80,000,000 and included raw materials, work in process, finished goods and supplies.

• GE: Adopted LIFO in a big way in 1955. The method is used to value substantially all inventories with domestically manufactured components. Adoption of the method resulted in a $20-million charge to 1955 net income which was largely offset by existing reserves.

• Monroe: Uses LIFO for valuing cost of material and direct-labor elements of inventory, but uses standard costs for manufacturing burden.

• Clevite: In most cases uses LIFO for valuing metal content of inventories.

Need Men? Read This..

Does your help-wanted 'ad' just subtract?

Or does it add the manpower you need? Here's what some electronics engineers think about today's employment advertisements:

• Says one engineer: "Some 'ads' are too prolific and promise everything. It's like listening to political speeches."

• Another says firms make a mistake "in looking for experts who don't exist." He feels they should accept men with broad backgrounds, not only specialists.

• "What do I care about golf courses nearby?" asks an engineer. "Tell me about working conditions in the plant. Tell me what kind of projects I'll be assigned to."

• Here are some things engineers like in advertisements: A list of a company's plants, and what is done at each. Examples of specific engineering problems that need to be solved.

• Another engineer says he likes the "we're in trouble—we need help" approach. It makes him read the entire advertisement, he says.

• Still another says he wants to know if a company conducts seminars, gives lectures, sends its engineers to conventions.

MERGERS, ACQUISITIONS and FINANCE

Litton Industries has purchased the West Coast laboratory of **Chromatic Television Laboratories** in Emeryville, Calif. and has entered into a licensing agreement with Chromatic. Litton hopes to develop further the Lawrence color television tube so that color radar can guide pilots into safer landings and help military airmen identify targets and terrain. Chromatic will become **Electronic Display Laboratories** of Litton Industries. The purchaser plans to concentrate on military and industrial uses of the Lawrence tube and will in no way enter the home-television field by the arrangement.

Raytheon president Charles F. Adams notes that close out of its television set business and unsatisfactory tube and transistor business helped produce the low earnings announced for seven months ended Dec. 31. Raytheon earned $654,743 or 23 cents per share in the last seven months of 1956. This was less than half earnings in the same period in 1955.

Industrial Instrument, Houston, has offered 29,500 shares of 6 percent preferred stock ($10 par) to residents of Texas through T. J. Campbell Investment Co., also of Houston.

Advance Industries, Cambridge, Mass., formerly Ultrasonic Corp., earned $46,000 for the quarter ending Dec. 1956. Earnings have been averaging $15,000 per month in 1957. Firm had lost almost half a million in the year ended Sept. 1956 and about $6½ million in the two preceding years. Profits should pick up still further in the latter part of 1957. Some 61 percent of the organization is still working to complete loss contracts. But most of these run out in July.

Federal Electronics has become affiliated with **Packard-Bell.** Financial details were not disclosed. But two Packard-Bell vice presidents, Richard B. Leng and William H. Moore, have joined Federal's board of directors. Packard-Bell's technical products division will build the Sigalert Emergency Warning System, a Federal patented system.

CBS raised its March quarterly dividend payment on A and B stock from 20 to 25 cents a share.

Dictaphone, which is splitting common four-for-one, paid $1.20 March quarterly dividend on present common compared with $1 in preceding quarter.

Hancock Electronics, California, producer of closed-circuit television products, has offered 300,000 shares of common stock ($1 par) through Daniel Reeves & Co., Beverley Hills. When Hancock completes its financing it will merge with **HEC Corp.** of Redwood, Calif. Until then it will use HEC facilities under contract.

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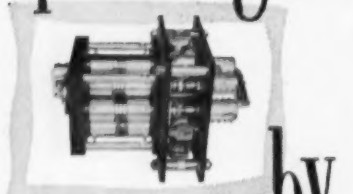

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WASHINGTON report

ENGINEERS have apparently won the latest round in their long battle with scientists over which group should be dominant in controlling the military's multibillion research and development program.

Secretary of Defense Wilson appears to back engineers—who favor concentrating the Pentagon's money on applied research projects—with appointment of Frank D. Newbury, retired Westinghouse vice president, to the newly-created position of Assistant Secretary of Defense for Research and Engineering. This job combines what had been two equal-authority positions:

- **Assistant Secretary for Applications Engineering, which Newbury has held up to now.**
- **Assistant Secretary for Research and Development, which has been vacant since the resignation of C. C. Furnas, representative of scientists, who returns to his position as Chancellor of the University of Buffalo.**

Newbury's appointment makes it appear that, when decisions have to be made between applied research and continuation of more fundamental studies, applied research will stand a better chance at the top—where the decisions are made. Same holds for decisions that determine how long a research team should be kept in control of a project—and how much say they should have, if any, when the product is turned over to engineers who will get the product into production.

Selection of a conservative engineer to head military research efforts has aroused some criticism, but not all from scientists.

SENATE probers sight in

Senate investigators plan to study the number of producers of important product lines in electronics and other industries. They want to learn how much competition there is in such markets as household radio and tv receivers, all types of components including capacitors, resistors and electron tubes, and telephone-telegraph equipment.

Businessmen can now propose proper tax life—that is, the annual depreciation rate, used in returns, of any equipment they use or sell to other companies to use in business. The official guidebook—Bulletin F—is being revised for the first time since 1942 to bring it into line with actual life of equipment, and to include items of electronic equipment that weren't in existence 15 years ago. Write: Commissioner of Internal Revenue, Washington, D. C.

No quick decision will come out of the new flare-up about subscription television. Both Commerce Committee of Congress and FCC would rather avoid making a pro-pay-tv decision. Staff study by Senate Commerce Committee leaned over backward to make sure that nothing in their pro-pay-tv report could be interpreted as jeopardizing present tv service.

Uhf television gets a break from FCC—which has ordered deintermixture in six market areas. Additional rulings in some 30 other cases will be coming. All uhf from now on will be: Albany-Schenectady-Troy, N. Y.; Elmira, N. Y.; Springfield, Ill.; Evansville, Ind.; Fresno-Santa Barbara, Calif.; and Peoria, Ill. On the other hand, FCC authorizes vhf stations in New Orleans, and keeps Hartford, Conn. and Madison, Wis., all vhf.

TWO HEADS are better than one...

ARC's Course Director CD-1, Teamed with ARC's VOR/ Localizer Receivers 15-D, Shares the Work with the Pilot

More and more pilots rely on the ARC CD-1 Course Director to determine the exact headings required to intercept and fly a desired VOR radial or runway localizer. This electronic "co-pilot" helps them fly with pinpoint precision, greater ease and increased safety, and in four simple steps.

With ARC's CD-1, the pilot selects his VOR or localizer station, sets his Course Director to the bearing of the desired VOR radial or localizer, turns his aircraft until the vertical needle of the cross-pointer meter is centered and steers to keep it centered. His ship will intercept the selected track quickly and smoothly, simultaneously compensating for wind drift. The pilot performs no mental computations, and there's no chance of overshooting the desired course.

This reliable navigational aid adds only 10 pounds to your aircraft. Ask your ARC dealer to install the CD-1, along with a *dual installation* of ARC's Type 15-D VOR/Localizer Equipment. You'll discover how easy flying VOR and Localizers can be – and with new peace of mind.

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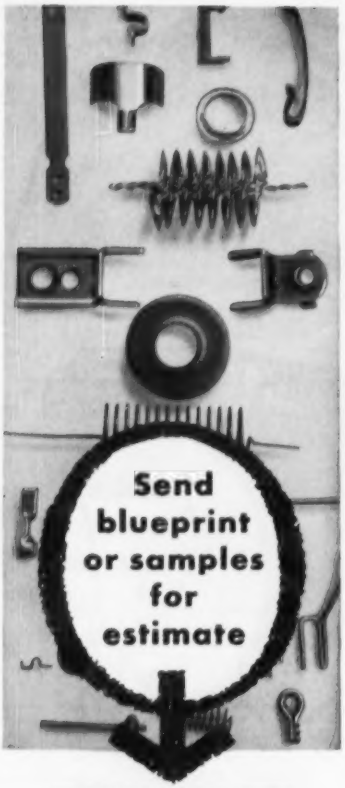

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EXECUTIVES in the news

MIT's Stratton: "half business manager, half educator"

THIS WEDNESDAY, Chancellor Julius Stratton of MIT receives the IRE's Medal of Honor. The award goes to the 55-year-old physicist, who says he's "half business manager, half educator," in recognition of his 29 years of work at MIT.

When he was 14, Stratton was a ham operator in Seattle. He went to sea in 1918 as a wireless operator on the Japan-Philippines-Hongkong run. Something of a rover until his job strapped him to Cambridge, he's been up the Yukon and down the headwaters of the Amazon, seen most of Europe, North Africa and the Pacific.

As executive officer of MIT (also his alma mater), Stratton has a finger in a whole bakeryful of pies. "There's a lot of just plain business management to this job," he says, adding "it's complicated by the fact that it's an academic institution." He has a lot to say about the budget (a hefty $60 million last year), runs the academic program, is "inside administrator" for the Institute's growing research program.

What time he has left he devotes to his wife and three daughters—aged 9, 11 and 14, a combination he describes as wonderful but "rough"—and to his Vermont farm, which he keeps in timber.

Strictly PERSONAL

Wanted: Research

Editor:

The *Technical DIGEST* comment on "coated" contact points (ELECTRONICS Feb. 20, p 21) brought to mind some interesting wartime experiences with hermetic-sealed relays in military servo drives, which gave us this same baffling problem. We used to cure this ailment by "flashing" the

points with short-circuit current pulses and "burning" them clear.

We couldn't figure this one out either. Apparently a research job is required here.

TED POWELL
HAZELTINE RESEARCH CORP.
LITTLE NECK, L. I., N. Y.

Nickel

Dear Sir:

In an article . . . on the nickel supply (ELECTRONICS Jan. 20, p 28) you give consumption figures broken down by application. . . .

I would be interested in knowing the source of your figures and particularly whether the 1½ million pounds quoted for magnetic alloys includes both commercial and military.

C. C. HORSTMAN
WESTINGHOUSE ELECTRIC
GREENVILLE, PA.

Statistics on the use of nickel were obtained from the U. S. Bureau of Mines, which reports primarily electronic uses as a single separate classification. There was no breakdown between civilian and military uses.

50,000 Teachers

Editor:

In your *Industry Outlook* (ELECTRONICS Feb. 20, p 1) you suggest that closed-circuit tv can take the place of an estimated 50,000 teachers now unavailable.

This is a lecture on a grand scale indeed. The most pressing need for teachers is in the formative grades, before the student begins to develop his own mental disciplines. Is this where tv will be used as a replacement?

And who'll answer the questions?

There's a sociological problem here that I don't think an electronic device can answer. Not until 1984, anyhow.

MARY C. POWERS

MT. EPHRAIM
NEW JERSEY

A lecture is a poor second-best to the personal attentions of a teacher. But it at least provides the kids with the material for making up a question.

from design through production...

ELECTRONIC CONTROLS

FOR AIRCRAFT AND MISSILES

Today some of the toughest electronic problems are being solved by Thompson's task force of engineers. For example: Thompson has designed and is manufacturing control subsystems and components for aircraft and missiles. Thompson also is a leader in development and production of countermeasures equipment and microwave components.

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auxiliary power supply controls

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THESE ARE SPRAGUE'S TWO OUTSTANDING
HIGH-TEMPERATURE MAGNET WIRES

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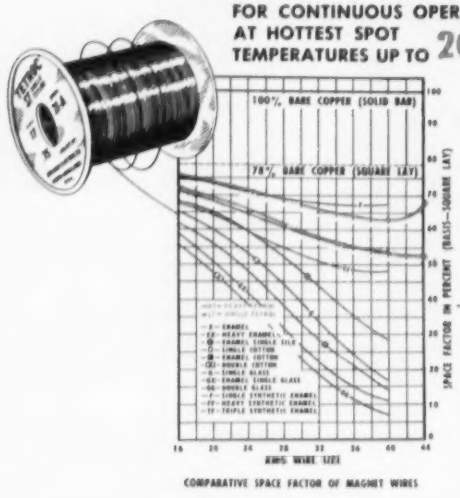

COMPARATIVE SPACE FACTOR OF MAGNET WIRES

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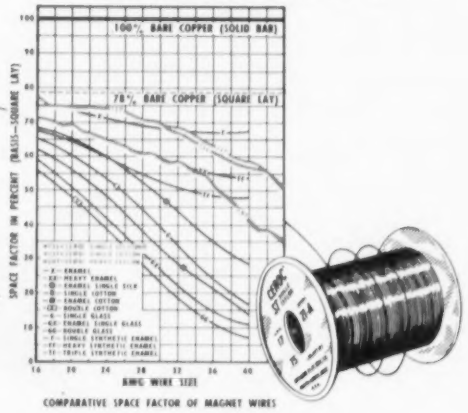


COMPARATIVE SPACE FACTOR OF MAGNET WIRES

SPRAGUE offers you a choice of 2 *truly* high-temperature magnet wires:

TETROC is recommended for continuous operation at hottest spot temperatures up to 200°C (392°F) and up to 250°C (482°F) for short periods of time. Tetroc, a teflon-insulated wire is available in both single and heavy coatings.

CEROC is recommended for continuous operation at hottest spot temperatures up to 250°C (482°F) and up to 300°C (572°F) for short periods of time. Ceroc wire insulation consists of a ceramic base with either single or heavy Teflon overlays—combining the best properties of both materials.

Both Tetroc and Ceroc Magnet Wires provide extremely high space factors.

FOR COMPLETE DATA WRITE FOR ENGINEERING BULLETIN 405 (TETROC WIRES) 400A (CEROC WIRES).

SPRAGUE ELECTRIC COMPANY • 35 MARSHALL ST. • NORTH ADAMS, MASS.

electronics
business edition
MARCH 20, 1957

John J. Hopkins—president of General Dynamics
The Atomic Revolution now altering our way of life, and about to raise the world's living standards, does not necessarily call for further complication of our already complex business organization. Indeed, the modern trend in administration is the use of more efficient management rather than a mushroom-like expansion to meet needs which have not yet presented themselves, and may never exist.

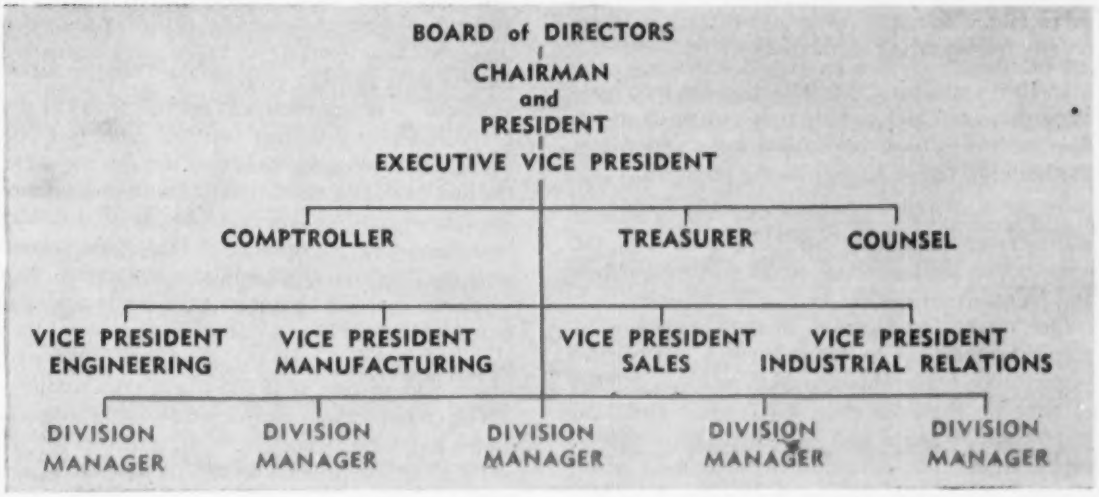


CHART typical of the setup some electronics firms are using to cope with problems of growth

Organizing for GROWTH

Adolescence is often a period of painful readjustment
Rapidly growing electronics firms are undergoing this process
Expanding companies must decentralize; merged firms must integrate

GROWTH, merger and acquisition are making some large corporations in the electronic industry even larger. Bigness, which has advantages in resources, also has kingsize headaches. Two distinct problems exist.

- Companies that have experienced rapid internal growth often find their centralized management unable to cope with problems of diversified operation. Personnel on the corporate level find it increasingly difficult to keep abreast of details.

- Companies that have gotten larger through acquisition and merger must integrate a number of divisions that once were separate corporations.

Commenting on recent changes at IBM, T. J. Watson, Jr., president, says: "The fundamental

reason for the moves . . . is that we want to . . . place all of the decisions as close as possible to the area where the need for the decision arises."

R. J. Cordiner, GE president, expresses similar views. "Decentralization places authority to make decisions at points as near as possible to where actions take place."

However, there are often differences in the degree to which a firm decentralizes.

"The organization of GE is essentially a three-part structure which carefully distinguishes between the operating, service and executive functions."

". . . General Electric's products are engineered, manufactured and marketed by nearly a hundred decentralized operating departments, each of them bearing full operating responsibility . . . "

In IBM's structure, the distinction between operating personnel and executives is not so clear cut. Five executives, each responsible for a segment of the business, report directly to the president.

These executives also comprise the corporate management committee, which counsels with the president on matters of an overall corporate nature and programs for specific areas of the business.

One of the five segments of the company is its corporate staff.

For other firms, organizational problems consist of tying up the loose ends of mergers. This kind of corporation starts as a completely decentralized organization. The individual divisions must be integrated into the corporation.

As Robert P. Meiklejohn, vice president in charge of administrative research for General Dynamics, says: "We are starting from opposite directions. However, all successful diversified corporations must end up at about the same place. They must find that point between complete decentralization, where the mutual benefits to corporation and division are not realized, and a highly centralized operation, where individual division managers are stifled."

RAILROAD gets computer network

CANADA took a big step in data processing last week. Canadian Pacific Railway started operating a transceiver network linking stations from New Brunswick to British Columbia to an IBM 705 computer in Montreal.

Freight yards and offices, stations and shops send data to eight centers where it is put on punched cards. Cards are placed in transceivers to send data over the railway's telegraph lines to Montreal.

As each punched card comes out of the transceiver a code arrangement automatically checks accuracy of each digit and number of digits.

Data is received on punched cards. Data is then converted to magnetic tape for high-speed entry to the computer. Output from the computer is punched on cards and sent by transceiver back to the eight centers.

BIZMAC goes to work

BIZMAC computer is now simplifying the inventory-control problems of Army's Ordnance Tank-Automotive Command. The $4.1-million RCA electronic data-processing system, comprising some 220 units of 19 kinds of gear and covering 20,000 sq ft of floor space, has been working at OTAC headquarters in Detroit since July last year.

Bizmac was unveiled earlier this month after OTAC's file of 2 million punched cards had been converted to magnetic tape and the inventory control and cataloging operations had been programmed. Another Bizmac system, used by Associated Merchandising Corp., is installed at Higby's department store in Cleveland, Ohio; a third is in Camden, N. J.

Bizmac handles computing and file-processing functions separately in a central computer and three electronic sorters. Files are stored in 182 tape units which read or write at 10,000 characters a second.

The computer uses two 16,000-character magnetic drums and 4,096 characters of magnetic-core storage, can add 50,000 pairs of digits in a second. Drum access time is 5 milliseconds, transfer rate from drum to cores is 100,000 characters a second, core access time is 20 microseconds.

Input units transcribe data from keyboard to paper tape, paper tape to magnetic tape (12,000 characters a minute) or punched cards to magnetic tape (400 cards a minute).

Output units convert magnetic records to print (600 lines a minute on a flying-wheel high-speed printer), or to paper tape and from paper tape to typewriter.

Referred to as the largest system of its kind, Bizmac ignores the trend toward miniaturized solid-state circuits, uses 27,000 electron tubes, 62,000 semiconductor diodes, 200,000 resistors, 400 miles of wire. It needs 250 tons of air conditioning.

OTAC is responsible for design, manufacture, supply and maintenance of all Army wheeled and track vehicles. Supporting a million-odd units of tank and automotive equipment—with 6,000 maintenance items for a tank and 4,000 for a transport vehicle—the command inventories 170,000 items. Twelve major depots, ten in continental U. S. and two overseas, are connected to Bizmac by an IBM transceiver network.

Looking AHEAD technically

National IRE convention provides peek at future
1957's emphasis on transistors, antennas, controls
Microminiaturization, millimicrosecond pulses featured

THIS WEEK, some 50,000 engineers and management men will descend on New York's Coliseum and Waldorf-Astoria hotel for their annual conclave the National Convention of the Institute of Radio Engineers. In four days (Mar. 18-21), they will

- Attend their choice of 55 technical sessions, including several devoted to production and engineering management
- Listen to 275 papers ranging from "A Non-Mean-Square Error Criterion for the Synthesis of Optimum Sampled-Data Filters" to "The Art of Human Relations"
- Look at exhibits by 840 manufacturers displaying their wares in the Coliseum

To the engineering fraternity the convention is a chance to hear what's new in other labs, renew old acquaintances, take part in intellectual cross-pollination.

To management, it's something else: a window, however foggy, into the future. This year the window discloses some fascinating vistas.

Transistors permeate the atmosphere. Not only are there more than two dozen papers specifically discussing new transistor types, applications and circuits, but many other papers touch upon transistor horizons. Smaller, cooler circuits—industry's big demand—mean more solid-state research, more transistor business.

Military requirements arouse much interest in antennas (including printed arrays), propagation and navigation.

Work to be reported in the convention includes uhf scatter techniques to overcome mountains and other terrain difficulties, antennas designed for high-speed high-altitude aircraft, navigation and locating systems.

Communications and broadcasting are stressed, with multiplex communications receiving special emphasis. New radar techniques include high-precision ranging by phase-comparison radar.

Industrial electronics will come in for a good deal of talk. New look in control systems will include aircraft controls to reduce pilot errors and a wide range of industrial and nuclear controls.

The tangled knot of air traffic will be the subject of a luncheon discussion by presidential aid Edward P. Curtis (Electronics, Mar. 10 p 14) and a symposium headed by Bureau of Standards' S. N. Alexander.

Radically new techniques of microminiaturization—pushing miniaturization of equipment to its extreme limit—and millimicrosecond pulse circuits point future trends in the industry.

Techniques for making gear smaller will concentrate not so much on smaller parts as on more sophisticated circuit design to eliminate some parts and connections, compact chassis layout to pack parts in tighter, more efficient heat transfer to remove—or use—dissipated heat.

Long-range work is being done on the solid-state circuit, a single chunk of semiconductor ma-

Hold that GLOW

INTERNATIONAL Geophysical Year scientists will use 23 of these spectrographs to photograph aurora spectra from pole to pole. Made by Perkin-Elmer, they use photometers and electronic circuits to direct optical and camera systems and record data

terial which will do the work of several active and passive elements.

Millimicrosecond pulse techniques are now being applied to instrumentation and photography. Cameras can capture a movement as fleeting as 1/10,000,000 second. Millimicrosecond pulses can increase computer speeds 10 times or more.

Navy reveals DATA LINK

SOME bottlenecks in air-traffic control may be overcome by a new Navy data-link system declassified last week. Equipment was developed by Federal Telecommunications Laboratories.

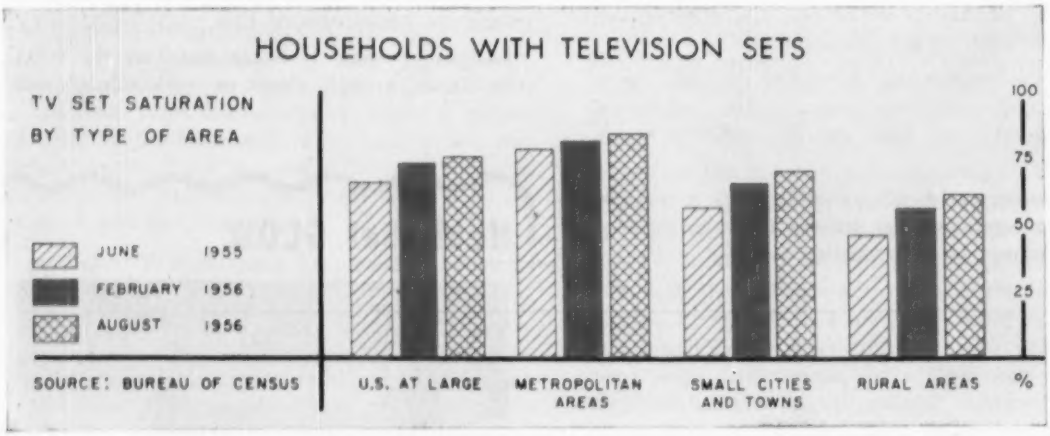
Called the TACAN Automatic Reporting and Data Link System, the system is said to be capable of serving up to 120 planes simultaneously on each of 126 separate frequency channels. It permits push-button selection of up to 31 routine messages between pilot and traffic controller. Messages are sent at rates ranging from ten per second to one every six seconds. For international use, data-link receivers can be adapted to the user's language.

TACAN data link requires a "black box" addition to TACAN or VORTAC-equipped aircraft.

FTL President Henri G. Busignies says the development is complete, ready for production. Navy is reported to be operating a number of the data links experimentally. Civil air officials have seen the data link demonstrated.

Approximate cost of a TACAN data-link ground equipment is $20,000, additional airborne TACAN equipment $1,500 to $5,000. Data-link equipment consists largely of transistor circuits.

PRODUCTION and SALES statistics



U.S. tv market was 76 percent saturated in August 1956. The Census Bureau came up with this figure after making a sample survey of all U.S. households (both wired and unwired, in and out of tv-signal range). This percentage compares with Census findings that 73 percent of all households had tv sets in Feb. 1956 and 67 percent in June 1955.

The August 1956 survey found greatest saturation in northeastern metropolitan areas where 86 percent of all households had tv sets. The percentage for all metropolitan areas was 84.

The percentage of tv households was lower in the nation's small cities and towns, more than 2,500 but less than 50,000 population, where 69 percent of all households had tv. The nation's rural households reported 60-percent tv penetration.

The least saturated sections were southern and western areas, outside of metropolitan areas. In such areas of the South 54 percent of all households had tv sets. In western outside areas 58 percent had tv. But, 83 percent of households in western metropolitan centers had sets.

The Census survey also indicated that increases in the number of households having two or more tv sets is proceeding at a slow walk. The percentage of multiple-set owners, which had jumped from two to four percent between June 1955 and Feb. 1956, showed no increase in August.

RETMA reports an increase of more than one million radios shipped to dealers by manufacturers during the first 11 months of 1956 compared with the same period in '55. Radio shipments through Nov. 1956 totaled 6,877,836 units and compare with 5,803,541 units shipped in the first 11 months of 1955.

EXECS get fringe benefits

Small electronics firms need executive talent badly
Problem is how to pay top calibre leaders
Deferred compensation plans often do trick

BECAUSE OF limited capital, small electronics firms are sometimes hard pressed to find and hold the kind of executives they need to operate successfully. As a result, a number of deferred compensation plans have evolved.

Often a few talented engineers or scientists get together with an idea for a new electronic device. They produce it in limited quantities in someone's basement or garage. Suddenly, an aircraft manufacturer sees the item and decides that he wants one in every plane.

The little firm immediately needs two things: capital and management know-how. If it is fortunate, somebody with business experience and a pocket full of cash may be interested. He may make a major stock purchase and also join management. Another possibility is that a bigger company may buy in.

Some small firms do not like either of these alternatives. However, they find that banks are unwilling to lend large sums for production facilities unless convinced that the business is in experienced hands.

On rare occasions, the bank suggests possible executives. More frequently, the firm itself hears of suitable men. But, a small firm is not always in a position to pay salaries ranging from $15,000 to $40,000 a year to policy-making executives.

According to Dean H. Rosensteel, director, executive compensation service, American Management Association, a number of methods have evolved.

Deferred compensation is becoming a common method used by small electronics firms to recruit and hold good management personnel. The executive agrees to take somewhere between 20 and 50 percent of his annual salary spread over a period of years after he leaves.

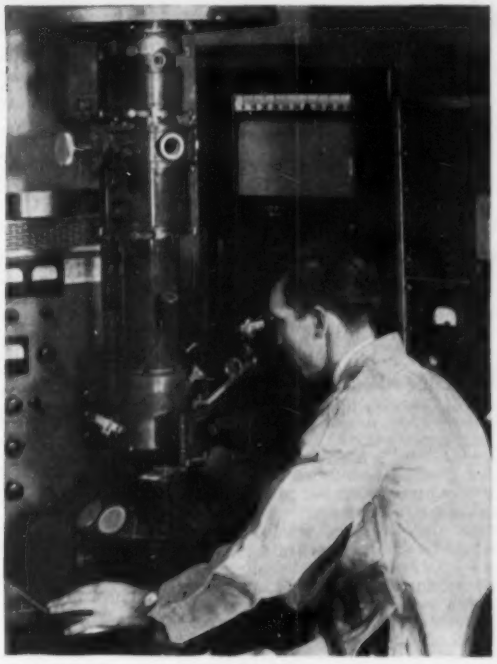
The company then gets badly needed executive talent at a lower initial cost. The executive gets a degree of future security. He also pays less income tax than he would if he got all of his salary at once.

A straight salary, even if deferred, has limitations. As Robert P. Meiklejohn, vice president—administrative research at General Dynamics, recently said: "It is a blunt and inflexible tool for motivating executives and relating executive compensation to the consequences of executive action."

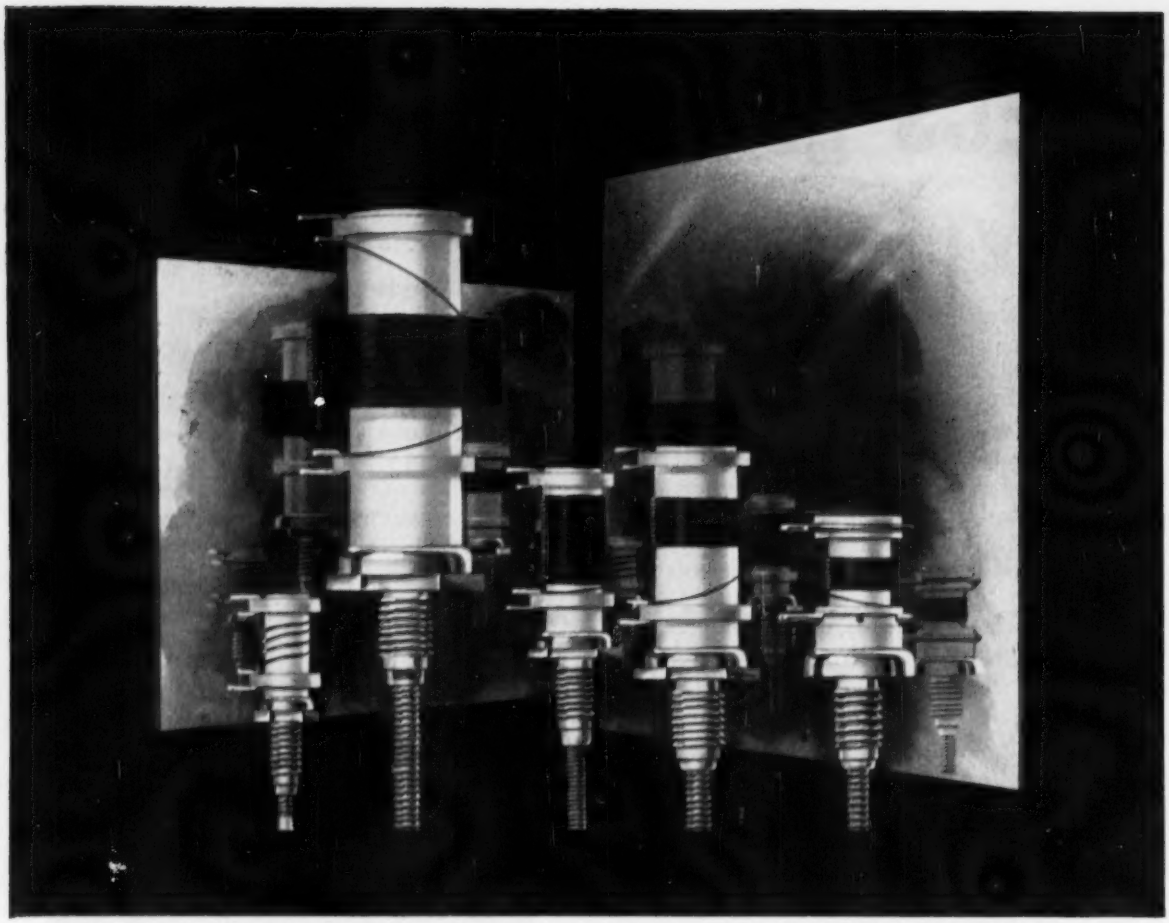
Bonuses of money or stock are a common means for compensating executives. Because they are based on performance, they provide additional motivation.

Stock bonuses do not require that the firm give up badly needed capital. In addition, since the value of stock in the future will depend to some extent on the executive's performance, he is further motivated to make the company successful.

Probes STEEL sample



ELECTRON MICROSCOPE and wavelength interpretation equipment develop point-probe microanalysis of steel samples at U. S. Steel. The microscope's beam excites x-rays in sample. Charting the rays permits quantitative analysis



CTC coil forms with Perma-Torq* Tensioning Device are designated PLST, PLS-6, PLS-5, PLS-7, PLS-8 and are factory assembled to mounting studs. The units are completely interchangeable with CTC's LST, LS-5, LS-6, LS-7 and LS-8.

Reliability is their family resemblance

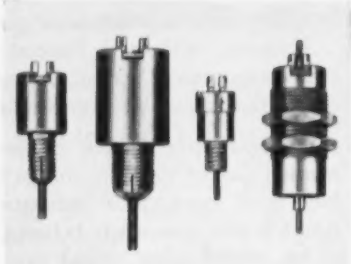
Here's a reliable family of coil forms ready to meet your specifications. These Perma-Torq Tensioning Devices on CTC coil forms allow locking of tuning cores while still tunable — and you can depend upon them to do their job well.

This built-in dependability is a result of CTC's unique design plus quality control — that meets or betters government specifications.

Perma-Torq is a compression spring of heat treated beryllium copper, that has a very high resistance to fatigue and keeps coils tuned as set — even under extreme vibration and shock. The device also allows for immediate readjustment — without removal or loosening of any mounting nut or locking spring.

Quality control and features like the above are just two of the reasons why CTC can offer you guaranteed standard or custom electronic components — whose performance you can rely upon.

CTC researchers and practical experts are always available to help you solve your component problems. For all specifications and prices, write Cambridge Thermionic Corporation, 437 Concord Ave., Cambridge 38, Mass. West Coast stocks maintained by E. V. Roberts and Associates, Inc., 5068 West Washington Blvd., Los Angeles 16, and 61 Renato Court, Redwood City, California.



CTC miniature shielded coil forms are rugged and perfect for "tight spots." The LS-9 is 7/16" diameter ½" high. LS-10 is ⅝" diameter x 1 9/16" high. The LS-11 is 5/16" x 17/22. The LS-14 is double ended and is ⅓" OD, 1 and 9/64" overall in length. All are highly shock resistant with mechanically enclosed protected coil windings. The units are ideal for use with IF strips or as RF coils, oscillator coils, etc. Available as coil form assemblies or wound to your specifications.

*Patent pending.

CTC

CAMBRIDGE THERMIONIC CORPORATION

makers of guaranteed electronic components
custom or standard

COMPUTERS cut road costs

$52-billion national road-building project means more computer sales
U. S. Bureau of Public Roads pushes for more use in highway design
Twenty states have equipment installed or on order

As THE NATION'S $52-billion highway building program gets underway, road builders are turning to electronics to compensate for the shortage of highway engineers.

For computer manufacturers, the road-building program is opening up a multimillion dollar sales and rental field that has been barely scratched. Estimates are that 10 percent of a highway's cost goes for engineering. Administrators of the road-building program want computers to carry much of the load.

The Bureau of Public Roads has set up a special office for finding new uses of electronics in road building. Many states have already forged ahead on time-saving programs of their own.

Recently, state highway engineers from all over the country met with representatives of the Bureau and of electronics manufacturers in Los Angeles to pool knowledge and experience.

One goal of the meeting is to establish a computer-program library sponsored by the Bureau to save states the time and expense of duplicating basic engineering already done by other states.

Before a state can get electronic computations for a project it must first spend weeks working out programs to determine what basic information has to be fed into the computer. Once the computer program has been worked out it can be used by other states for similar projects.

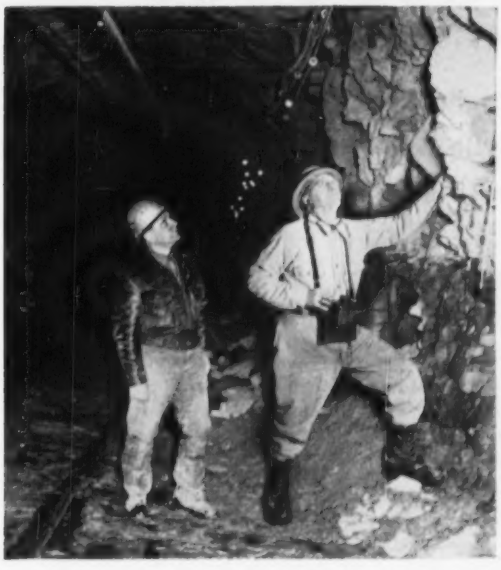
Computers are to be used for determining highway location, roadway design, interchange design, right-of-way descriptions, line-and-grade computations and earthwork computations. The computer speeds up bridge design. It can be used in traffic studies, traffic simulation, cost analysis and checking photogrammetric work.

The Bureau of Public Roads estimates that 80 to 85 percent of the engineering time required to design a bridge is saved by using a computer. Determining the magnitude of earth-moving projects can be done about 30 times as fast when computers are used.

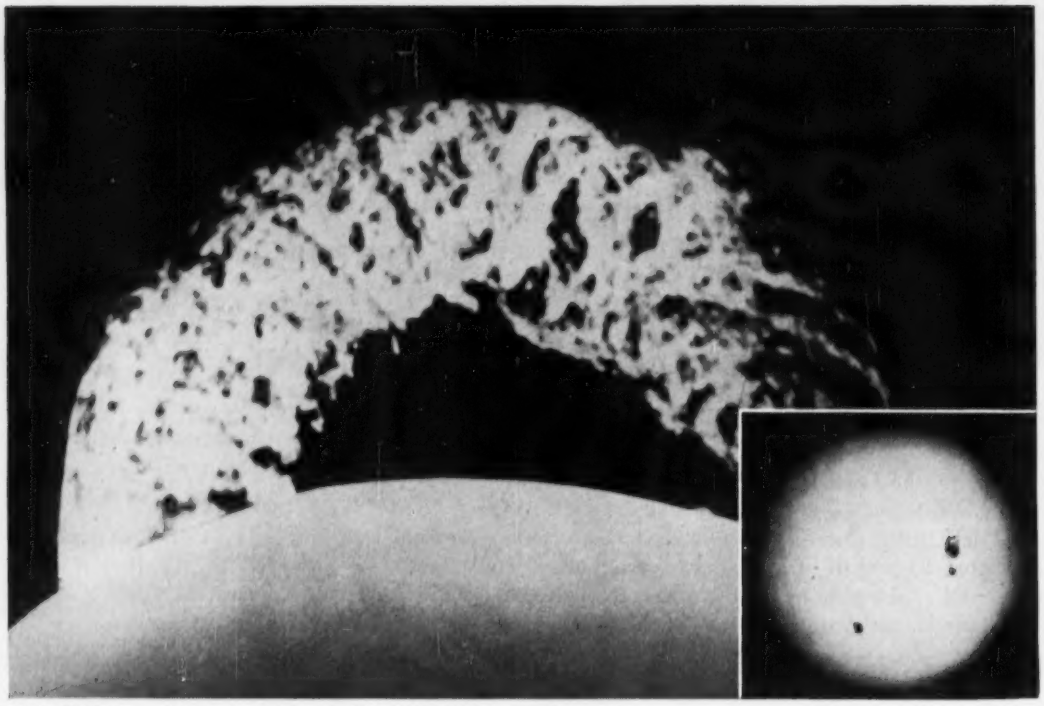
Through use of the computers, engineers are able to locate a highway where it requires the least amount of dirt moving. Proper location of a road can save 10 percent in the earthmoving costs of the project. From $10 to $12 billion will be spent for earthwork on the 13-year road program. Arizona, California, Texas and Washington compute earthwork electronically. Others are shifting over to its use.

More than twenty states are either using electronic computers or have ordered them. Others are likely to sign orders soon. Some of the states using computers are: California, Illinois, Texas, Michigan, Massachusetts, New York, Nebraska, Wisconsin, Virginia, Arizona, Connecticut, Louisiana and Ohio.

You load 16-TONS safely



SEISMETRON developed by Liberty Mutual Insurance can tell when the roof of a rock tunnel is likely to fall. A piezoelectric quartz crystal pickup held against the rock determines the amount of microseismic vibrations and is amplified.



TROUBLE on the sun means trouble in Earth's communications

Look out for SUNSPOTS!

Present cycle of sunspot activity is highest in modern history
Communications trouble shows up with increasing intensity
Predictions help communicators select frequencies

MAN HAS been watching sunspots since he first trained a telescope on the heavens. What sunspots have been doing to radio communications has been recorded in detail for less than a score of years.

The present sunspot cycle (peak activities occur every eleven years) is the second for which detailed radio data has been kept. This one promises to be extraordinary.

Using a complicated measurement ruler (having to do with the number of sunspots in a prescribed area as seen through a certain sized telescope), Central Radio Propagation Laboratory of the National Bureau of Standards is predicting this cycle will be in the 170-180 range.

"We're purposely being conservative," says Bureau authority Ralph Slutz. "If we used our routine formula the present prediction would be 196."

The last cycle average was 152. Highest ever recorded, back in 1778, reached 160.

Communications trouble is beginning to show up increasingly.

- British televiewers have had a rash of sudden inteference show up on their sets. New York taxi radio calls come in loud and clear.

- Rocket firing at Fort Churchill, Canada, has had to be rescheduled. Telemetering and tracking devices began mixing signals with Patrick Air Force Base in Florida, White Sands Proving Grounds in N. M. and Charlotte, N. C., taxicabs.

• Messages from Central America received by a Braniff Airways radioteletype operator in Miami turned into a lexicon of meaningless letters.

• A Geophysical Services petroleum prospector in Texas found himself chatting with prospectors in Colombia, South America. Each had equipment designed to go at most 20 miles.

Reason? Sunspots!

For equipment makers, long-distance communicators, hams and defense activities, the Bureau of Standards issues a monthly report on sunspots. Each report predicts the impact on communications three months in advance.

Of the more than 7,000 monthly reports issued, the Army, Air Force, and Navy get a fat majority. Civilian subscribers receive around 2,000. Most of these go to long-distance communicators.

Bureau of Standards feels that wider use can be made of their predictions. "Any radio-engineering firm with a propagation group should have them. Anyone putting in communications systems has to consider propagation in the light of sunspot activity."

Sunspot activity may wash out some frequencies, strengthen others. Predictions of sunspot activity help manufacturers select the optimum frequency, power and modulation method for a particular job.

These storms on the sun were first observed by Galileo in 1610. His discovery was discounted.

However, 185 years later the existence of spots was so firmly established that scientist and layman alike accepted Sir William Herschel's sunspot explanation. He said that they were merely holes in the hot clouds that overlay a cold dark sun.

England plans tropo SCATTER

England will soon have an experimental tropospheric scatter transmission link running from the south of England to Scotland.

Marconi's Wireless Telegraph Co. reports that tests over a 200-mile link connecting the north and south of England have been successful, and that the link will shortly be extended another 200 miles northward.

The company says experiments thus far "indicate a sound commercial future for communication systems making use of the tropospheric scatter principle."

Commercial plans are now to set up high-power transmitters and receivers at Newcastle, on the northeast coast of England, and London, and to operate up to 36 simultaneous telephone channels between these points, a distance of 270 miles.

Future tropospheric scatter plans, says Marconi, will depend upon available transmitter power. Telegraphing for 700 miles may be possible.

Technical DIGEST

Elongated invisibly small particles of iron may permit permanent magnets 10 times stronger than today's best. The ultrafine particles have been produced in small quantities in GE's Research Lab., Schenectady. Particles can be embedded in plastic, rubber or glass.

Man-made ceramic, announced by Horizons Inc., changes approximately 2,500-fold in resistance with an increase in relative humidity from 30 to 100 percent. Chief potential use is in replacing blonde human hair as a humidity-sensing element in controls.

Earth-satellite electronics will require special shielding because of currents generated in metal shell as it cuts through earth's magnetic field at about 18,000 mph.

Evaporation cooling permits miniaturization of high-voltage magnetron power supply and audio transformers for high-temperature applications up to 125 C. Raytheon-developed technique uses high-dielectric fluorochemical liquid in sealed transformer case; liquid vaporizes at hot spots on winding, then condenses on inner surface of transformer case.

New 2N174 power transistor by Delco requires only 1 watt input power to switch 1,000 watts, making possible two-transistor substitute for 13-ampere vibrator in airborne d-c converter for stepping up storage battery voltage to plate supply values.

Use of 840-cps motor-generator power in place of 60 cps on fluorescent lighting improves efficiency enough to reduce power consumption 20 percent, with corresponding reduction in air-conditioning load. Radio interference, ballast noise and stroboscopic effect vanish at 840 cps.

Helium-filled glass spheres ¼ inch in diameter are being used for exploring electric field strengths in resonant cavities of linear accelerators. Brightness of the ionization-produced glow is an indication of field strength.

GIMMICKS needed in tv?

Something new is necessary and important
But market for novelties has been thin
Remote controls get even more remote

"People," said one industry spokesman last week, "who want to buy a tv set just buy it. They're interested in the picture. Gimmicks are not important in selection. But, of course, you have to have something new to offer or people won't read your ads."

Something new in tv can mean anything from placing the control knobs on top of the set to building lightweight portable models.

Portables came swimmingly out of the gimmick classification when they swallowed up almost a third of the 1956 market. "But who knows what knob placement did for the market?" asks one company.

Remote tuning, a simple electrical device, had been offered as optional equipment by many manufacturers for several years. "There was not much of a market for it," says one manufacturer. "Some shut-ins, maybe. It was a thin effort."

Then another firm seized on the notion of ultrasonic remote tuning. Wires discarded, complete command of the set was put in a hand-sized, four-button control unit you could walk around with. It could switch the set on and off, change channels and control volume.

This year still another manufacturer is offering a miniature radio transmitter and receiver control that can operate up to 25 feet from the tv set.

The transmitter, working on battery, signals all switch changes to a small receiving unit.

One novelty that got its share of ad space was the clock tv set. Possible to set as an alarm clock, it became a wicked instrument of torture in the hands of little children.

Waking up at 1:30 am to the sound of a gunfight on the late, late show was too much for even the most gimmick-minded parent.

Still in the laboratory is a tv set geared to operate to the soundless whisper of a dog whistle.

Though the appeal for novelties has always been small, it nevertheless exists. No set maker is ignoring it. He can little afford to ignore anything that might change the face of the tv set market.

It is the words "might change" that makes manufacturers put pressure on their laboratories for something new. They know the major appeal this year: The smaller the set (without drastic reduction of picture size), the happier the buying public is. Advent of the portable proved that.

About 40 percent of all tv sets sold in 1957 are expected by some setmakers to be portables. Portables, which accounted for 20 percent of 1956 tv set sales, rose to 31 percent in the last quarter of '56. In 1955, only 4 percent of tv sets sold were portables.

It's not considered likely that remote controls for sets will ever stimulate a buying trend on an equivalent scale. However, not many setmakers will dismiss them completely. "Anything's possible," says one.

TV SETS go a-c/d-c

A design trend toward a-c/d-c tv receivers is apparent, comparable to a similar trend with radios in the 1930's. Not only fewer consoles, but fewer wooden cabinets are expected. Rather than the plastic cabinets in which most a-c/d-c radios are housed, tv sets will come in either steel or aluminum cases.

Few basic circuit modifications are being made in tv sets. Most changes are made to decrease weight and size or to reduce production costs.

Connecting tube heaters in series, for example, eliminates the need for a filament transformer, reducing both weight and cost.

The 110-degree picture tube, which permits smaller front-to-back dimensions, is mentioned frequently in new set designs.

Printed circuits reduce labor costs, permit automatic production and require less time for production-line inspection.

According to Bill Wiley, engineering manager for Sylvania tv chassis design, 60 to 70 percent of the circuitry in new models is printed. He feels that fewer troubles arise in the printed circuit set.

At present, use of semiconductors in tv sets is expected to be largely limited to diodes.

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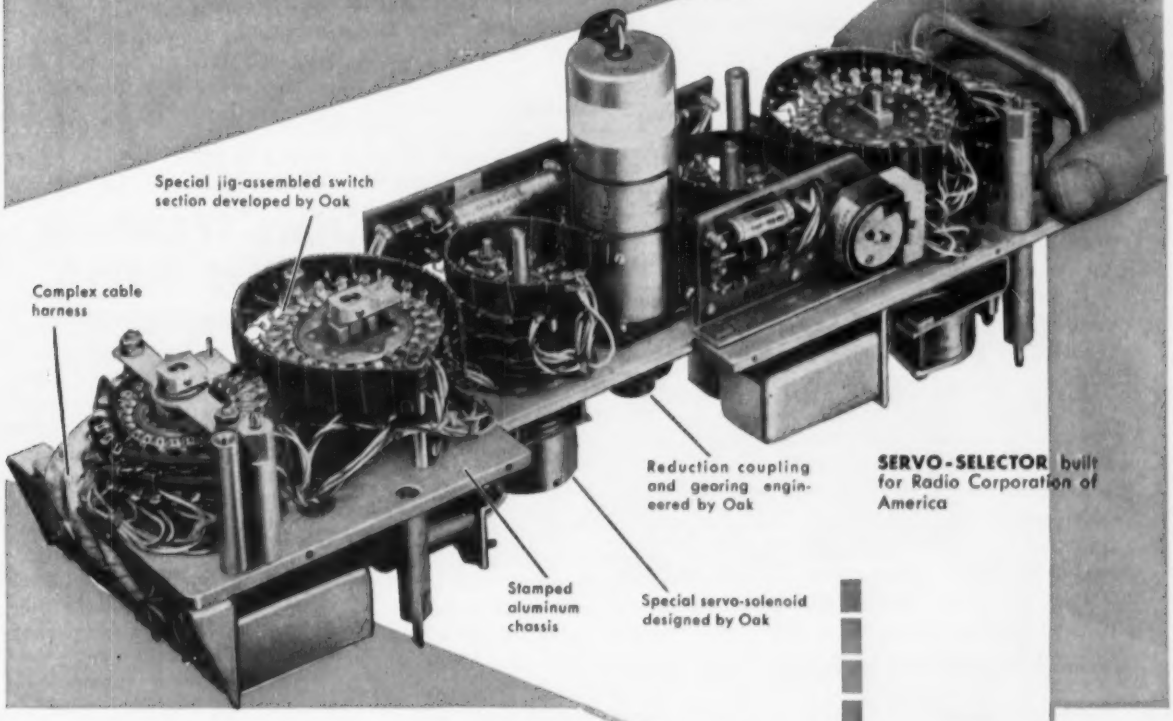
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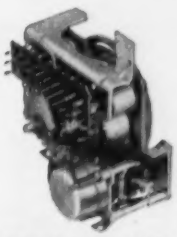

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FLAT TUBES in five years

Picture tubes show history of flattening
Monochrome heads for 110 degrees
90-degree deflection color tube also due

"SOMETHING NEW!" It's the cry that goes up in every competitive industry. Television set manufacturers have been continually looking for something new since the first flicker on the first picture tube.

Hot competition has shrunk the length of the tv picture tube by widening the tube's deflection angle. Early tubes had a deflection angle as small as 55 degrees. It soon was up to 70 degrees. 1957 saw the angle increased from 90 to 110.

It took more than 10 years. The push is now on for a flat tube or display method which can be hung from the wall like a picture.

Color tv tubes, now at 70-degree deflection, will make the jump to 90 in a few years. But probably not until a large market appears.

The flat tube is in the works in most tv setmaker's laboratories. No one expects a quick breakthrough. Five years is one company's estimate for the first models to reach the market.

RCA says that it has temporarily put its probings into flat-tube developments aside. Sylvania is hard at it, using its panelescent lighting system as part of the technique. GE has a flat display method under study. DuMont, among others, is examining various approaches.

The only flat tv tube in the U.S. announced thus far is Kaiser's. A British version of a flatty is being experimented with by National Research Development Corp. The latter is also a color tube. Using a method in which the field scan is effected by a traveling electric wave as with the Kaiser tube, NRDC has pooled patents with Kaiser.

BOATING market still small

EQUIPMENT like this low-cost depth finder shows promise

PLEASURE boaters annually spend about $1.25 billion, but of this only about $4 million is for electronic communication, navigation and depth-finding equipment, with radiotelephones getting the biggest share.

Radiotelephones sell well, says George P. Aldridge, RCA marine sales manager because they are a safety factor and satisfy gregarious instincts. FCC statistics show their use in pleasure boats has increased from 8,200 in 1947 to 55,000 in 1956. By comparison, there are less than 200 yachts outfitted with radar, most of them corporation boats.

Low-cost depth finders show promise. Raytheon, which makes one priced at $150, estimates that 50,000 can be sold in that range through 1961. Hudson-American, which recently redesigned its radiotelephone line for compactness, expects that its sales will go up 25 percent in 1957.

But the real mass-market in boating, the outboard motorboats, are relatively untouched. Aldridge says he'd be happy to see a simple, low-cost portable receiver that could be used for weather reports and direction-finding.

More TECHNICAL training needed

EXPANDING use of electronic computers and industrial process controls demands future workers whose skills include technical knowledge.

Such workers will require a level of education and training which has not been fully explored nor developed in this country, the U. S. Department of Labor warns.

Workers or technicians will require more than high-school level training. This means technical institutes and junior colleges must expand their area of activity.

States and local communities must consider extending the technical level of their public school systems to provide the semiprofessional labor forces required in industry.

More effective vocational guidance for both youth and adults is also needed to produce the future supply of technicians.

No occupation can be counted on to stand still, says the Department of Labor. Workers must learn continuously and be prepared for job and occupation changes.

The Bureau of Labor Statistics is updating its Occupational Handbook, a basic tool in vocational guidance. The Bureau is also conducting case studies to assess the impact of electronic controls on jobs, wages and industrial relations.

"Through research and education," says BLS Commissioner Ewan Clague, "a broader understanding of the human implications of current technological changes will certainly help to realize more fully their benefits."

FREQUENCY STANDARDS

TYPE 50

AVIONIC
FREQUENCIES
PRECISION FORK

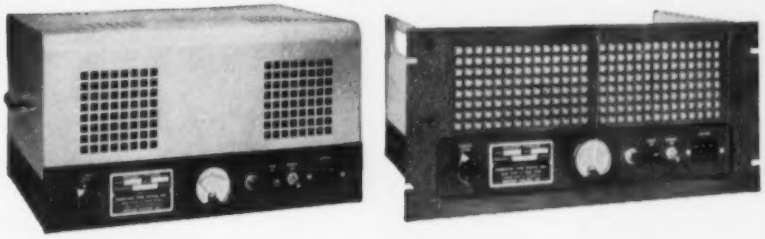
FREQUENCIES
240–400–500–1,000 cy.

ACCURACIES
Type 50 ±.02% (—65° to 85°C)
Type R50 ±.002% (15° to 35°C)

Requires double triode and 5 pigtail components

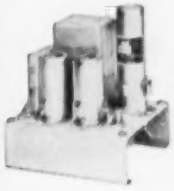
Size, 1" diameter x 3¾" high
Weight, 3.5 ounces

POWER
75 Watt
FREQUENCY STANDARD
TYPE 211IC



FREQUENCIES: .....50 to 1,000 cycles
ACCURACY: ..±.002% (+15° to +35°C)
OUTPUT: .....115V, 75 Watts
INPUT: .....110V, 50 to 75 cycles
SIZE: with cover....10"x17"x9" high
PANEL model,..10"x19"x8¾" high
WEIGHT: .....25 pounds

INDUSTRIAL



FREQUENCY STANDARD
TYPE 50L

FREQUENCIES
50–60–75 or 100 cy.

ACCURACIES
TYPE 50L
±.02% (—65° to 85°C)
TYPE R50L
±.002% (15° to 35°C)

INPUT: 150 to 300V, B (6 V at .6 amps.)
OUTPUT: .....2V into 200,000 ohms.
SIZE: ..3¾"x4½"x5½" high. Wgt., 2 lbs.

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Paul DeKoning, President of Jantzen, Inc., says:

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"Speed is essential. The styles that catch on are followed by big re-orders.

"To meet the demand – before our competitors do – we rely on Air Express!

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"Air Express is using radio-controlled trucks to hustle shipments on the ground to and from airports. And any shipment can be instantly traced by the new Air Express private teletype system.

"Yet, we save money by specifying Air Express. For instance, a 10 lb. shipment from Portland, Oregon to Kansas City, Missouri costs $6.66. That's 57¢ less than any other complete air service."

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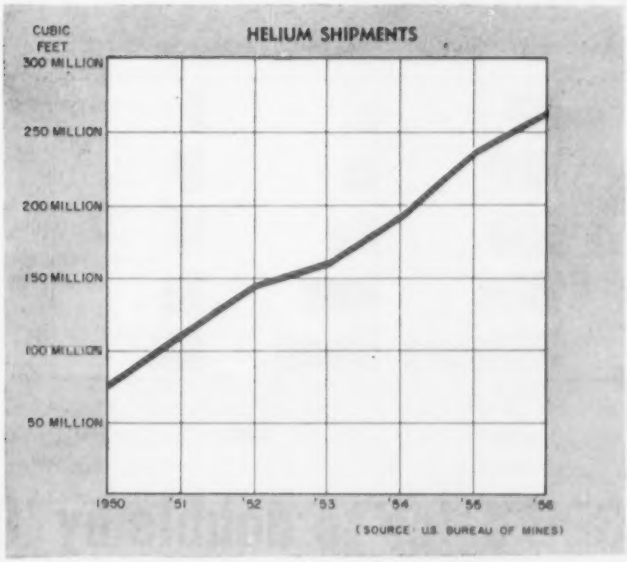

HELIUM reserve shaky

Government urges argon be substituted
Electronic, other uses, triple needs
Natural gas sources dwindling

HELIUM will be easier to get when a new Bureau of Mines plant in Texas is on-stream this spring. But long-range supplies are so uncertain the Bureau advises argon be substituted where possible.

Inert helium protects transistor crystals from contamination during processing and allows arc welding without fluxes. Its ability to flow through minute openings tests high pressure or vacuum seals.

There is considerable disagreement whether argon can substitute for helium shielding. Argon is acceptable in some instances and preferred in others. Sometimes a mixture of argon and helium is better than either alone.

"We hate to see uses for helium building up," says H. P. Wheeler, a Bureau of Mines expert on helium, "because the day will come when production capacity can no longer meet demands."

A conservation program is under study, but helium supplies are dependent in the long run on reserves of natural gas, in which it is found. Gas fuel consumption is rapidly depleting these reserves—some say they may not last in quantity beyond 1975—and no important new fields have been discovered in recent years.

Military, atomic energy, medical and scientific users, as well as industry, are increasing demands. Shipments have risen from 81 million cubic feet in 1950 to 265 million in 1956. The new Texas plant will raise capacity to 400 million cubic feet annually, but Wheeler doubts that will suffice for long.

Argon, however, makes up almost one percent of air. Air Reduction Corp., a distributor of both argon and helium, says argon does not present a major supply problem. It is generally available as a by-product of oxygen reduction. Prices of argon and helium are comparable.

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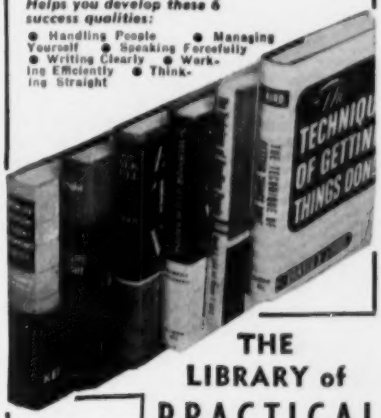

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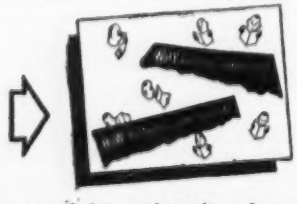

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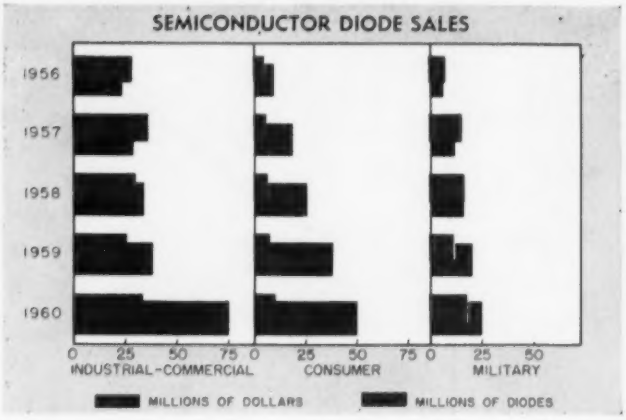


DIODE sales to double by '60

Silicon may outsell germanium

Price reductions expected

Big market seen in consumer products

VALUE of semiconductor diode sales is expected, by at least one manufacturer, to double by 1960. Number of units sold is expected to triple. Reduced unit price will result from improved metallurgical and production processes.

CBS Hytron is using automatic machines to produce germanium glass diodes and expects to install machinery for automatic production of other types. The machines are said to cut production costs in half.

Average cost of a silicon diode may be reduced to less than 50 cents by 1960. This would make semiconductor diodes economically feasible in many more high temperature applications. Of the 150 million units expected to be sold in 1960, the majority may be silicon. During 1956, three germanium diodes were sold for every silicon diode.

There are presently a half-dozen firms actively producing semiconductor diodes and about 10 more who are in the business at least in a modest way. Approximately 17 more firms are interested in manufacturing them. With the expected reduction in the cost of manufacture, price reductions may be expected in the field by about 1958.

Color TEST GEAR needed

TV SERVICEMEN are beginning to get a few calls to "come see what you can do with my color set."

Those who are able to say, "I'll be there," are few. It's not lack of knowledge that keeps the others in the shop. It's a lack of equipment.

As some tv set makers rub their hands in anticipation of quantity color set buying, the test equipment group looks forward to the same move. "We're the Siamese twin," says one test-equipment maker. "The more color sets out, the more test equipment needed."

Items the serviceman needs include a convergence or dot generator, a wide-band scope and a color-bar generator. These are minimum requirements.

One firm, which has been mak-

ing color test equipment for two years, has a combination color-bar and convergence generator that it touts as the industry's most popular sales item.

Another test-equipment maker says, "A color-bar test pattern is virtually essential for checking and adjusting the phasing and matrixing circuits in color television receivers since it is probable that color-bar test patterns may not be telecast at the time the receiver is being installed or serviced."

For a minimum of color test equipment, the serviceman will pay around $500.

CANCER spotting gets attention

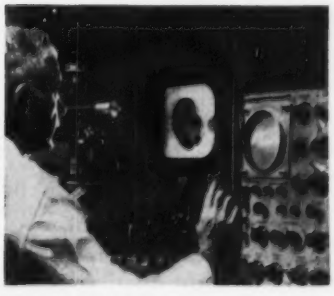
CANCER-detection specialists are hopeful that electronics will make their job easier. RCA's developmental ultraviolet-sensitive tv camera tube is the latest effort in that direction.

Now undergoing experimental examination at the National Institutes of Health in Bethesda, Md., it may serve as a diagnostic tool for quickly determining the nature of a diseased cell.

The tube, added to a standard monochrome tv camera and hooked in with a high-power microscope and electronic oscilloscope, can obtain direct observation and oscillographic measurements of the metabolism of living cells.

The Cytoanalyzer, being developed by Airborne Instruments, resembles a television technique.

Airborne expects to have two of its machines installed in the Fall.



ULTRAVIOLET view of cell activity is provided

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Push TECHNICIAN pay hike

Cordiner committee renders report
Urges boost for military techs
Also more contract maintenance

DETAILED PLAN to help Armed Forces hold electronics maintenance and repair men has been drafted by an 11-man Defense Department Advisory Committee headed by GE president Ralph J. Cordiner.

The plan centers around changes in military pay scales to keep skilled military specialists in uniform. It also proposes across-the-board wage increases of at least 5 percent for civilian engineers, scientists and technicians employed by the Defense Dept.

It is uncertain how far the administration will go in accepting the Cordiner plan. Pentagon estimates the proposals would add $575 million to the military budget.

Cordiner Committee's major recommendations are:

- Military pay structure for enlisted men should be increased from seven to nine grades, mainly to benefit technicians; in-grade pay boosts should be granted in existing ranks.

- Proficiency bonuses amounting to one or two grade increases should be paid to enlisted men with the most critical job skills; this could cover as much as 15 percent of total enlisted strength.

- Pay rates for senior officers should be boosted to bring salaries more in line with industry rates.

The Committee suggests that military technician requirements could be reduced through increased contracting with civilian companies to handle maintenance and operations of military equipment. Defense Secretary Wilson, however, is cool to the idea; he's worried that it may be "a device for paying more for the work."

Commenting on the high turnover of skilled technicians, the Committee says: "It is foolish for the Armed Forces to obtain highly advanced weapons and not have men of sufficient competence to understand, operate and maintain such equipment."

Of 74,000 enlisted electronics technicians who completed their initial tour of duty last year, only 9.8 percent reenlisted. The Defense Dept. estimates it spends up to $40,000 over three years to train certain specialists, needs a reenlistment rate of 33 percent for electronics men to keep up a stable work force economically.

Advancing weapon technology is expanding the military's need for skilled specialists. Now, 44 percent of enlisted men are technicians and mechanics. At the end of World War II, such men made up only 34 percent of the enlisted ranks. The largest manpower increases have been for maintenance of electronics and armament systems.

MILITARY electronics

Temco Aircraft's rocket-powered missile target, the XKDT-1, is comparable in size to operational air-to-air missiles. However, missile guidance systems and radar stations will "see" the device as large as a fighter aircraft on their scopes. The target missile will be tested at the Naval Air Missile Test Center, Point Mugu, Calif. within the next few months.

Douglas will use a 200-channel Beckman 112, transistorized data-processing system for research on the Thor IRBM. The system will automatically monitor, in 90 seconds, information from as many as 200 individual thermocouples and strain gages attached to missile parts. Delivery of the $80,000 system is scheduled for September.

Radome, 61 feet in diameter, has been produced by ARDC and Firestone of Canada. Supported by low air pressure, the new radome withstands 100-mph winds. Efforts continue for development of new materials and techniques for building radomes 100 feet in diameter.

CONTRACTS awarded

Eclipse-Pioneer division of Bendix has received two contracts: $6,736,102 with Air Materiel Command for central air data computers, converters and compensators for use on F-101 and F-105 aircraft; and $285,183 with Navy Aviation Supply Office for amplifiers.

Convair has been awarded a contract amounting to approximately $29 million by the Navy for production of guidance and control units for Terrier missiles.

Chance-Vought has received Navy orders totaling $26 million for additional production of Regulus I,

Navy operational attack missile, and of Regulus II, an advanced supersonic missile.

Associated Missile Products, Pomona, Calif., a subsidiary of American Machine & Foundry, has received a $19½-million contract from Martin for guided-missile instrumentation.

Temco Aircraft has received a Navy contract for approximately $16 million for design and development of a new, still-classified guided-missile weapons system.

Bendix Radio division has signed a $9,927,631 contract with the Air Force for new high-powered, extended-coverage radar sets developed jointly by Bendix and ARDC.

GE has been awarded a $4,594,905 contract by Air Materiel Command for development, mockup and testing of a new single-sideband tropospheric scatter system. Initial delivery is scheduled for next Fall.

Crosley division of Avco has been awarded a $2½-million contract by Air Materiel Command for type MD-O fire control equipment for bombers.

Sylvania is developing UDOFT, the first Universal Digital Operational Flight Trainer, under a $1-million-plus contract with the Naval Training Device Center. The program is under joint sponsorship of the Air Force and Navy.

Telecomputing has sold to the Los Angeles Ordnance District testing equipment amounting to $689,110.

Kollsman Instrument has been awarded a $552,409-contract by Air Materiel Command for Type C-2A true airspeed and Mach number computers for B-52 aircraft.

Elgin National Watch's production of safety and arming mechanisms for Nike has doubled due to a new $360,000 contract with the St. Louis Ordnance District. The mechanism is being produced at about half the cost of an earlier model due to watch-manufacturing techniques.

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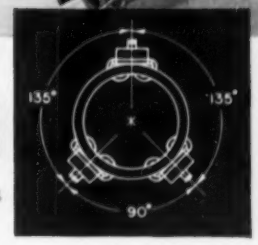

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2. Less man-hours in assembly time.
3. Consistently uniform quality.
4. Elimination of rejects.

Berg lugs provide a completely reliable soldered joint and are available on Resinite Printed Circuit Coil Forms and Collars in three different types. One type is dimpled to hold the coil for... upward before soldering, while the other two can be bent over before soldering. Two to six lugs can be located at any desired angular configuration. Drawing illustrates a typical 90°-135°-135° polarized placement which guarantees correct printed circuit insertion.

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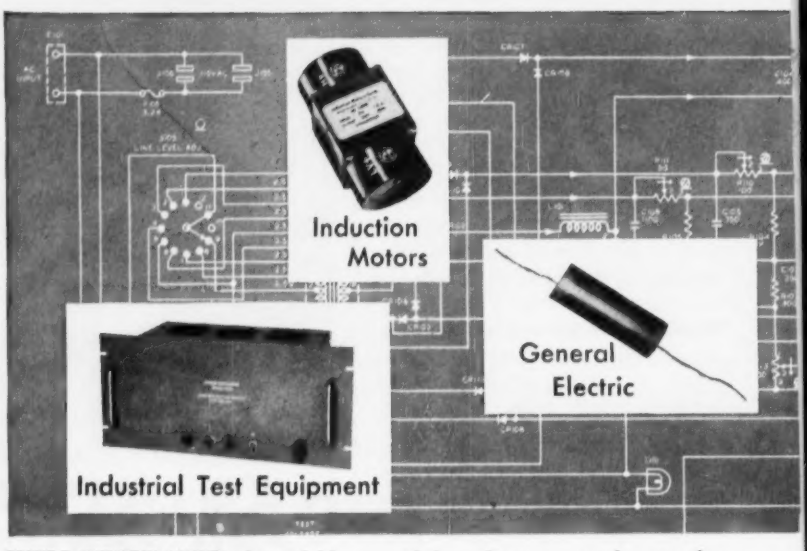


WELL-REGULATED, dependable a-c and d-c voltage sources for complex

THE ELECTRONICS INDUSTRY'S need for well-regulated, reliable and economical sources of power provides continuing impetus to the improvement of power sources. A precision 400-cycle oscillator is offered by **Industrial Test Equipment** (P1) to supply power for synchros, resolvers and servomotors. Dynamotors for application in missiles and telemetering installations are announced by **Induction Motors** (P2). Said to have a shelf life of over 20 years, **GE's** (P3) solid electrolyte battery delivers 95 volts and is less than one inch long. A line of silicon automatically regulated power rectifiers announced by **Christie Electric** (P4) provides up to 1,000 amps continuous output. Up to 1,012 volts d-c is provided by **John Fluke Manufacturing's** (P5) regulated supply, and magnetic-amplifier supplies by **Perkin Engineering** (P6) furnish 36 volts at 15 amperes.

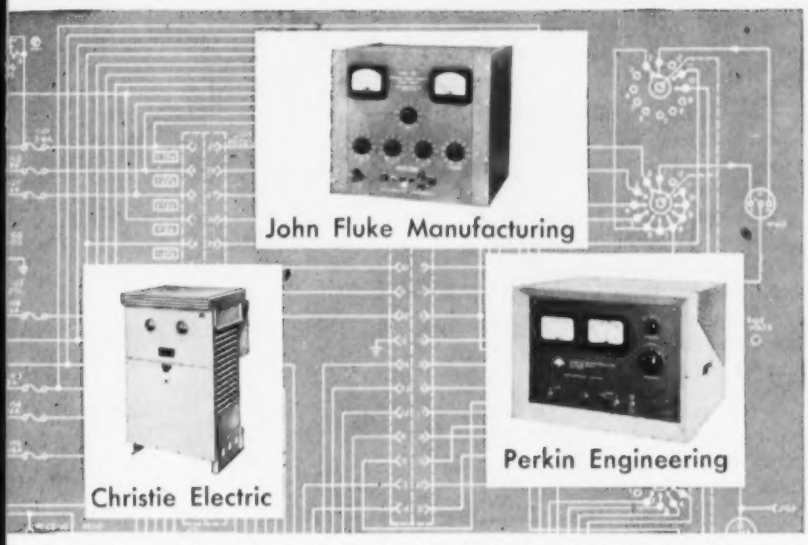
Machines for producing cross-wound coils have been announced by **Universal Winding** (P7) and feature a programming attachment for taking out taps. . . . Continuously variable delay lines offered by **ESC** (P8) for use as components or as test equipment provide delays up to 0.5 microsecond. . . . **Blonder-Tongue** (P9) announces a line of itv monitors with 14, 17 and 21-inch screen sizes and a video response flat within 1 db to 10 mc.

Double-ended miniature coil forms announced by **Cambridge Thermionic** (P10) have space for primary and secondary windings and separate tuning slugs. . . . Electronic instruments for testing the hardness of painted surfaces are offered by **Gardner Laboratory** (P11). . . . Designed for aircraft and instrumentation applications where space is at a premium, **DeJur-Amsco** (P12) announces the series 22 Continental connector.

Sodeco's (P13) 4 and 5-digit impulse counters in both a-c and

For more information circle numbers in SECTION B, READER SERVICE CARD (facing p 48)

supply power



electronic equipment are provided by products like these

d-c models register up to 25 impulses per second. . . . Magnetic shift registers offered by **Mack Electronics** (P14) may be used for buffer storage in input-output equipment, series or parallel shift registers and for data and program storage. . . . Transistor noise-figure meters announced by **Electronic Research Associates** (P15) are said to measure noise figure automatically and present it directly, in the range of 5 to 60 db.

Artos Engineering (P16) announces a machine that measures, cuts and strips wire leads and attaches an aluminum identifying tag at the rate of 3,000 pieces an hour. . . . Digital d-c voltmeters offered by **Electro Instruments** (P17) for laboratory and field applications are said to have an accuracy of 0.05 percent. . . . Operating from a plate voltage of 150 volts d-c, **Computer-Measurements'** (P18) 100 L series of decade counting units includes models for pulse, analog and binary output.

Kintels' (P19) 21-inch itv monitor is said to have a bandwidth in excess of 8 mc and horizontal resolution of more than 600 lines. . . . Called Phalene, a new insulation material developed by **Phalo Plastics** (P20) for use in high-frequency cables is said to have tensile strength of 2,800 to 6,400 pounds per square inch. . . . Accelerometers made by **Humphrey** (P21) for aircraft and missiles feature a special caging mechanism said to prevent potentiometer wear when the instrument is not in use.

Dalohm's (P22) A100-W trimmer potentiometers are now available in 18 standard values ranging from 10 to 100,000 ohms. . . . An amplifier announced by **Spencer-Kennedy Laboratories** (P23) for fast-rise pulses, multichannel very-high-frequency signals and wide-band intermediate-frequency signals is said to provide a stable 20-db gain over a 320-mc band.

Litton's (P24) load isolator for X-band radar weighs only one pound and has a maximum insertion loss of 0.6 db. . . . Phenolic and ceramic coil forms for printed-circuits are now offered by **Cambridge Thermionic** (P25) with up to 6 solder terminals. . . . Thermoplastic polyester resin tape, called GT tape by the manufacturer, **G. T. Schjeldahl Co.** (P26), is said to be ideally suited for chemically

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cementing magnetic materials. . . . Delay cable offered by **Columbia Technical** (P27) provides a delay of one microsecond per foot for radar, computer and color tv applications. . . . Self-locking hold-down clamps by **Whitney Blake** (P28) are said to eliminate the need for safety wiring on electronic instrument assemblies. . . . Ferrite load isolators developed by **Kearfott** (P29) for laboratory use absorb up to 10 watts.

Designed for testing contactors, relays and circuit breakers, a synchronous switch developed by **Rowan Controller** (P30) permits closing a circuit at any selected point on an a-c voltage wave. . . . **Lear** (P31) has developed a 60-cycle remote positioner for industrial applications. . . . A data processing system called Transac by **Philco** (P32) is completely transistorized.

Interchangeable tooling to insert all shapes of axial-lead components in printed wiring circuits are featured in **United Shoe Machinery's** (P33) No. 3 component inserting machine. . . . Transistor clips announced by **Atlas E-E** (P34) have been developed to meet the heat, shock and vibration requirements necessary for aircraft and missile applications.

Characteristics of **Electra's** (P35) line of ceramic disk capacitors include high Q, high insulation and low power factor. . . . **Marconi Instrument** (P36) announces a complete range of traveling-wave tubes for the 2,000 and 4,000-mc bands. . . . Ten-stage indicating binary counters offered by **Navigation Computer** (P37) are completely transistorized.

A high-production unit for aluminizing the screens of tv tube color plates or black and white picture tubes is being produced by **F. J. Stokes** (P38). . . . Called a T Plotter, an automatic ratio plotter developed by **Barry Controls** (P39) plots a complete vibration transmissibility curve in strip-chart form. . . . Precision metal film resistors are now available from **Weston** (P40) in values up to 1 megohm.

DuMont (P41) has developed a cathode-ray tube for nuclear investigations which affords writing rates faster than the speed of light. . . . X-ray units announced by **Westinghouse** (P42) provide both a fluoroscope image for on-the-spot observation and a 16-mm motion picture record. . . . **Uniconn's** (P43) single-degree-of-freedom gyro features low drift rate, low harmonics and low noise level.

Ace Electronics' (P44) precision wire-wound potentiometers covering 10 to 250,000 ohms feature jeweled bearings for low starting and operating torque. . . . Called a missing-pulse detector, **Manson Laboratories'** (P45) tube-testing unit for pulse-modulated magnetrons and klystrons responds to absent or low-amplitude pulses. . . . **Pameco** (P46) announces a panel-mounted electronic voltmeter with ranges up to 1,000 volts d-c.

Card-type wire-wound resistors announced by **Daven** (P47) have been designed for use in electronic equipment where limited space is available. . . . **Amperex** (P48) announces the type 6146 beam power tetrode for use as an r-f power amplifier and oscillator or an a-f amplifier and modulator. . . . Silver-cadmium oxide top lay contacts are available from **Metals & Controls** (P49) in fabricated parts or strip form.

Photocon Research's (P50) pressure-measuring instrument may be used with pressure transducers, flow meters and proximity transducers. . . . Precise measurement or control of linear acceleration over a frequency range from zero to 25 cps is said to be possible with **Donner Scientific's** (P51) servo accelerometer. . . . Total delays up to 300 microseconds are provided with **Underwood's** (P52) lumped-parameter electrical delay lines.

General Radio's (P53) vtvm for laboratory and production use features a shielded diode probe for uhf applications. . . . Encapsulated pulse systems for radar transmitters

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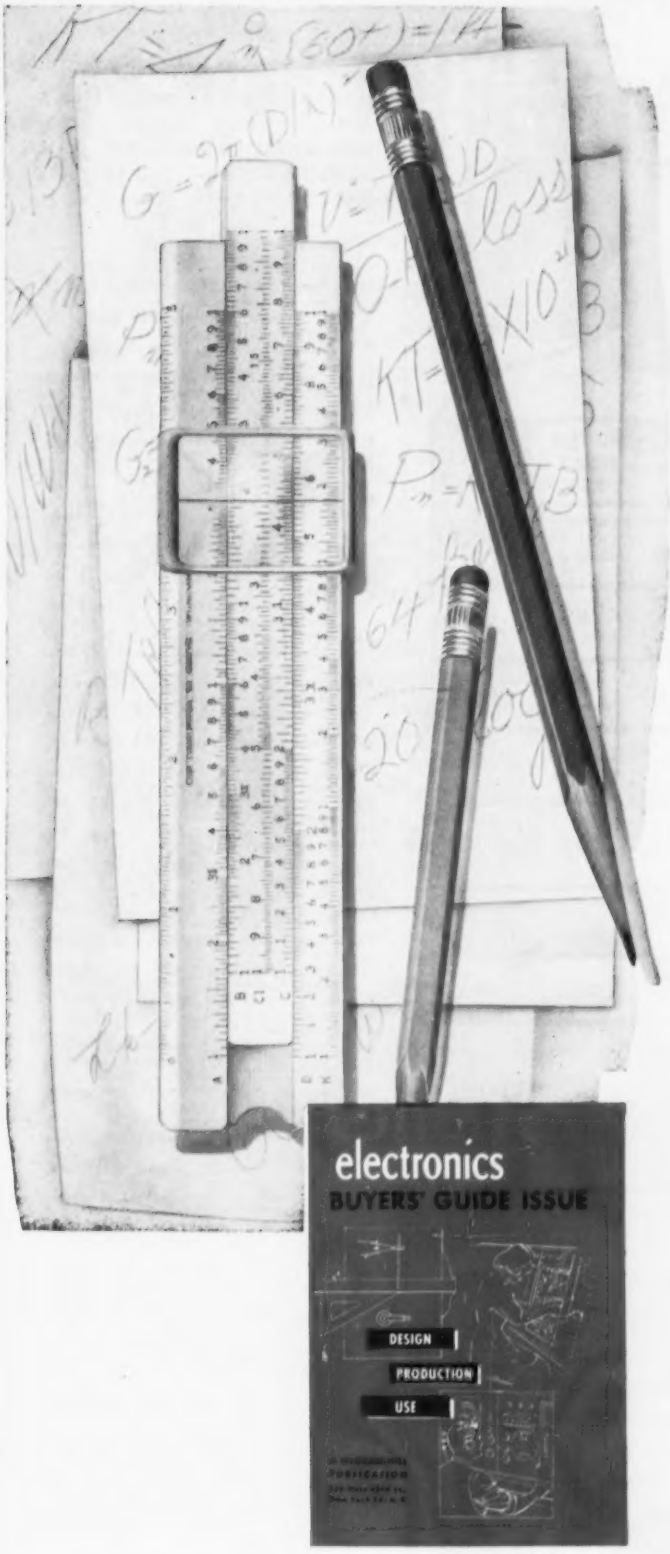

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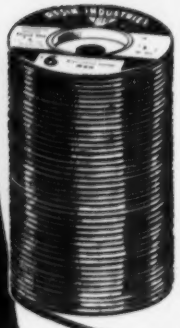

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73 plan EDUCATIONAL tv

May ease teacher shortage

24 stations now on air

Nine more starts certain

Of the 258 television channels reserved for education 24 have been picked up by educators and put on the air.

Joint Council on Educational Television expects nine more to go on the air in 1957. Another 40 are in varying stages of planning.

Equipment for an educational station varies with its location. Average price paid for a major-city installation is about $300,000. Boston's cost $500,000. Low-power stations in small communities can be constructed for as little as $50,000.

Raising money from state governments, educational institutions and private sources is no longer as stiff a problem as previously. One reason may be growing awareness of the teacher and facility shortage gripping education. And realization that there is little likelihood of it easing.

"There are so many students coming up," says Ralph Steetle executive director of the JCET, "how are you going to tool up for them if you don't use television?"

But educational channels may not be around when needed most. Two educational channel reservations have already been reallocated, for commercial broadcasting. In Denton, Texas noncommercial channel 2 may go the same way.

FCC Commissioner Craven's plan to table the allocations plan is seen by some as a threat to educational tv. JCET fears a grab-bag approach to allocations and a loss of all educational reservations. It expects to fight such a move if it comes before the commission.

President Eisenhower's answer to the controversy over releasing educational channel reservations to commercial interests seems clear. He says: "Speaking only from what I believe to be the eventual good of the United States . . . we must preserve channels for educational purposes."

Only educational station to fail and go off the air was a uhf in Los Angeles. Operators feel presence of seven vhf's in the area contributed to its demise.

Prospect of operating a uhf education station in a vhf-served area may have prevented Cleveland from starting construction of a station. $500,000 in state funds had been set aside for the project.

FCC actions

Cabinet rank for the FCC is suggested in a bill by Rep. J. Arthur Younger. Lumping the Commission with all agencies concerned with communications and transportation, Younger thinks they would "function much better . . . supervised by, and made responsible to, the Cabinet and the President . . ."

Construction permit for channel 13 in Eureka, California has been given to Carrol R. Hauser. Hauser has 45.3 percent interest in KVEN, Ventura, Calif.

Commissioner Craven's plan to discard the present tv table of allocations will not be considered until present deintermixture proposals have been completed.

FCC work load gets attention in at least one Congressional bill. Rep. Gardner R. Withrow is pushing to have the three-year license period of a-m and tv stations extended to five.

Commission reluctance to legalize booster tv stations is coming under heavy attack in Congress. Several bills have already been introduced that would force acceptance not only of boosters, but vhf tv translators.

STATION moves and Plans

KVOR, Colorado Springs, Colo., was sold by Riggs & Greene, Inc. to Dunbar Broadcasting for $142,000.

WESH-TV, Daytona Beach, Fla., is moving its transmitter closer to Orlando and raising antenna height from 320 feet to 940.

KASA, Elk City, Okla., was bought by Leo R. Morris, Jackson R. Webb and Carl Stephens. Seller was Southwest Broadcasting. Price: $50,000.

KNOK, Fort Worth, Texas, became involved in a complicated transaction which finds John W. Kluge paying more than $150,000 for the station and leasing the facilities to Associated Broadcasters. Kluge holds interests in KXLW,

Edited by DON FINK

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St. Louis, Mo.; WLOF, Orlando, Fla.; WWSW, Pittsburgh, Pa.; WKDA, Nashville, Tenn., and WGAY, Silver Spring, Md.

Keystone Broadcasting System adds nine affiliates for its transcription service. They are KUEN, Wenatchee, Wash.; WSKI, Montpelier, Vt.; WBLR, Batesburg, S. C.; KMRS, Morris, Minn.; KLLA, Leesville, La.; WCYN, Cynthiana, Ky.; WWXL, Manchester, Ky.; WWVR, Terra Haute, Ind. and KAIM, Honolulu, Hawaii.

KECC, Pittsburgh, Calif., changes hands from J. C. MacFarland and associates to John Malloy, John Grant, and Benjamin Strong. The price was $105,000.

WLAP, Lexington, Ky., passes from Gilmore N. Nunn to Community Broadcasting for $346,000. As part of the a-m sale goes the construction permit for uhf tv station on channel 27.

KROG, Sonora, Calif., went for $30,000. Buyers are Walter T. Eggers and George E. Johnstad.

WHAR, Clarksburg, W. Va., has been sold to Harrison Corporation by WHAR, Inc. for $97,453.

KBST-TV, Big Spring, Tex., brought $300,000. The channel 4 buyer is Texas Telecasting. Seller, Big Spring Tv.

KOSA-TV Odessa, Tex. has been bought into by Jack and Grady Vaughn. They paid $20,000 for a share in Odessa's channel 7.

Westinghouse Broadcasting is sponsoring an industry-wide conference on local public-service programming in Boston, Mass., Feb. 27-March 1.

KRSN, Los Alamos, N. M., joins ABC Radio as an affiliate.

KGEN, Tulare, Calif. has begun broadcasting.

WPET, Greensboro, N. C. ownership passes from Wayne Nelson to Guilford Advertising. Guilford paid $125,000.

DOUGLAS of Douglas Aircraft brandishes electrode harpoon (left). Sea sled (right) carries telemeter. Gear helps . . .

Fight HEART DISEASE

Electrodes take whale's pulse
Telemetering records it
Data may aid human patients

MEDICAL SCIENCE and electronics teamed recently to deal a blow against heart disease. Donald W. Douglas, president of Douglas Aircraft, donated manpower and equipment for Dr. Paul Dudley White's whaling expedition off Lower California. Purpose of the Boston cardiologist's junket was to obtain cardiac data from the California grey whale.

Because the heartbeat of this multiton mammal is only 12 per minute, it provides an excellent medium for analyzing neuromuscular activity of the heart. Data obtained may help spot trouble in heartbeats of human patients.

Taking the pulse of a whale is no simple matter. Here's how the expedition did it:

Two-man helicopter hovered over surfacing whale as a harpooner shot electrode-tipped darts into the fleshy back of the whale. Vinyl-covered stainless-steel wires connected to embedded tips served as electrical conductors and tow lines for the 7-ft, 140-lb glass fiber sea sled in which telemetering equipment skimmed after the whale.

Signals were telemetered to the expedition's ship and the party's base camp. Sanborn recorders made the electrocardiograms.

A J-type antenna, which folded flat against the deck of the sled while suspended aloft, snapped upright after the whale had been struck and the boat lowered. Also carried in the sea sled were a Sanborn amplifier, EMR oscillator and Bendix telemeter transmitter.

The 0.001-volt heartbeat signal received through the tow line was amplified to approximately 0.5 volt. This in turn modulated the oscillator. F-m/f-m telemetering was used. Transmitter power was 3 w.

On the ship and at camp, Clark telemeter receivers, tuned to 228 mc, picked up the signals, which were fed to an EMR 67A subcarrier discriminator thence to recording equipment.

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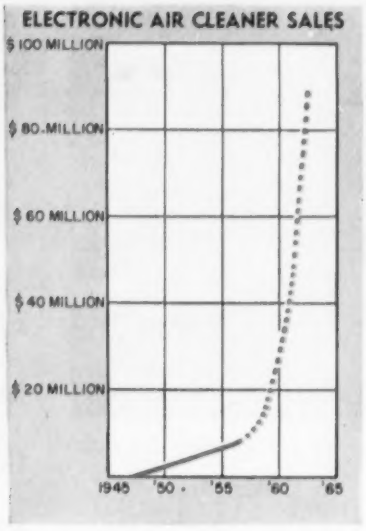
ELECTRONIC power supply delivers 13,000-v to grid of air cleaner



AIR CLEANERS: $90 million

Sales will rise to $90 million by 1962
Growth will stimulate rectifier market
Cuts building clean up cost 23%

AIR CLEANER sales will reach $90 million annually by 1962, predicts John E. Haines, head of Minneapolis-Honeywell's commercial division.

The prediction will hold if one-third of new commercial air-conditioning systems and one-tenth of homes are equipped. The breakdown will be $70 million commercial, at an average of $1,000 each, and $20 million for homes, assuming home-unit prices drop to $150.

R. C. Aitkenhead, sales manager of Electro-Air Cleaner, estimates overall 1957 sales will be about $10 million, compared with approximately $8 million in 1956 and $4.5 million in 1952.

Raytheon counts each of the four million hay fever and asthma sufferers as a potential customer. It recently reduced the price of its portable unit from $230 to $200.

Radex reports that housing developers and manufacturers of hot-air furnaces are making increased use of the cleaners.

In the picture is a potential increase in rectifier sales of several hundred thousand annually. Each air-cleaner power pack includes one or more high-voltage rectifiers.

The cleaners are electrostatic precipitators. Airborne soils, industrial wastes, allergens, bacteria and other particles are charged as they pass over a high-voltage grid. As the air passes over plates with an opposite charge, the particles are collected.

Some units handle 800 to 4,800 cubic feet a minute, can be installed in combination for higher capacity. The cleaners have proved over 90 percent efficient in removing particles that pass through filters. They can handle matter less than 1/1,000 micron in diameter, manufacturers report.

CAA to spend $2.8 million

CAA is buying electronic equipment from 15 companies amounting to $2.8 million. Auxiliary equipment, such as antenna towers and relay racks, will cost $2.2 million more. Here are some contracts:

- Radio Engineering Laboratories is building $1,032,229 worth of radio communications equipment for installation in CAA's Alaskan vhf radio network.
- Columbus Electronics: $473,973 for transmitter control panels, relay panels, power supplies and spare parts.
- Federal Telephone and Radio: $307,418.42 for RG8-AU cable, RG17-AU cable, transmission-line cable and RG59-AU coaxial cable.
- Munston Manufacturing and Service: $205,329.97 for dual-channel amplifiers and spare parts.
- Maxson Instruments: $182,419.95 for regulated-output amplifiers and spare parts.
- Wilcox Electric: $180,310.20 for radio-frequency transmission-channel rectifier, modulator units and spare parts.

TRANSISTOR prices ease

INCREASED demand for transistors has enabled manufacturers to produce in larger and more efficient quantities and thus lower prices, report spokesmen for Texas Instruments and GE.

Texas Instruments has reduced prices 50 percent on its vhf transistor, up to 10 percent on its silicon transistors and rectifiers and up to 14 percent on radio transistor kits. GE has cut prices 10 percent or more on 15 transistor models used in radios, hi-fi sets and phonographs.

Texas Instrument radio-kit transistors now range in price from $1.15 to $1.35. GE's line is under $1.25.

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A partial listing of skills

- Airplane Repairmen
- Architects
- Chemists
- Construction Machinery Operators
- Designers
- Draftsmen
- Electricians
- Engineers — Chemical
- Engineers — Civil
- Engineers — Electrical
- Engineers — Mechanical
- Engineers — Mining
- Fabrication Metal Products
- Fabrication of Textile Production
- Foremen Construction
- Furnacemen Smelters Pourers
- Loom Fixers
- Machine Shop
- Miners Mining Machine Operators
- Power Station Operators
- Radio Operators
- Surveyors
- Tinsmiths Coppersmiths
- Toolmakers Die Sinkers Setters
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DUTCH report rise since '50

Holland's business is Philips'
Philips' business is her own
Sales jump two and threefold

THE STORY of electronics in Holland is pretty much the story of Philips Incandescent Lamp Works, probably the largest electronics concern in Europe.

The company is believed responsible for more than 90 percent of Dutch electronics output.

Philips, however, is reluctant to release data regarding production, sales or exports. But growth of the industry can be discussed in terms of an index that arbitrarily assigns 100 to Philips' world sales of various items in 1950.

World sales of electron tubes rose to 250 in 1955 and have continued rising.

Radio and tv world sales rose to more than 250 in 1955, showing a 26 percent rise over 1954. 1956 sales are said to show a further increase.

In the telecommunications field, Philips' world sales index rose from 100 in 1950 to 450 in 1954, then receded to 330 in 1955.

The Works at Eindhoven employs some 58,800 persons, of whom 70 percent are presumably employed in electronics and allied departments.

The company has decentralized. It includes the Philips Telecommunication Industry in Hilversum, a large new transistor factory and the Philips Research Center in Eindhoven.

The 3,000-worker Hollandse Signaal Apparaten Fabriek which concentrates on military electronics, especially fire controls and radar, is almost entirely owned by Philips.

Production encompasses the entire range of electronics from components to equipment, with the exception of big computers.

Direct interests abroad are widespread with Philips factories being found in nearly all European countries and in many South American, Asian and African countries.

Developments ABROAD

Austria produced 10,000 tv sets up to the end of 1956, of which more than 6,000 were exported. Set prices range from $230 to $327. Regular tv is slated for this year when it is hoped some 150,000 sets will be in operation and viewer fees will help defray operating costs.

In London Marconi says its vhf equipment at a British Railways hump yard is speeding shunting operations. Two fixed and five mobile stations provide immediate contact between signal boxes and shunting locomotives, eliminate hand signals and shouted instructions.

England's BBC has nine sets of Pye equipment that allow tv shows to continue in case of camera failure. Each set has two projectors and two cameras. One camera is focused on a projector; the other is at right angle to it. Should the first camera fail, a mirror swings in front of the projector, allowing the second camera to take over in less than two seconds.

At England's United Steel Companies' research and development department a Siemens II electron microscope may spur fundamental studies of structural changes in alloy steel. The equipment provides magnifications up to 100,000 times.

In Australia tv production in 1957 is expected to jump to 200,000 from about 40,000 in 1956. Set production has been started by 23 makers, including most major U. S. and British tv-industry names. Picture tube and other component imports are expected to decrease as local manufacturing expands.

EXPORTS and IMPORTS

In Canada new responsibilities have been assumed by Canadian Aviation Electronics in the maintenance of eight U. S. Air Force Pinetree radar sites. The company's western division will support each site with a five-man group, including an engineer and four technicians.

Denmark's planned 5,000-kw nuclear reactor will get a Leeds & Northrup control system. L&N was previously awarded a contract for the control system for a reactor to be constructed at Sao Paulo University, in Brazil.

British electronics manufacturers will be represented at the IRE show this week at New York's Coliseum. British Industries will introduce laboratory standards and measuring equipment made by H. W. Sullivan. Mullard will introduce two new photoconductive cells for infrared detection. Stand-

ard Telephones and Cables will show photoelectric cell one-half the size of a paper match head and a 25-pound 4-channel communications system for small planes.

Denmark has announced a new policy to interest U.S. firms in establishing plants. Free transfer of profits and repatriation of direct investments is provided. Purpose is to expand production, increase exports, introduce manufacturing and managerial know-how.

In Mexico Lenkurt de Mexico, Latin American subsidiary of Lenkurt Electric, San Carlos, Calif., has begun assembling and finishing transmission equipment and microwave sets in a plant near Mexico City. Training and repair centers are expected to be established.

Spain's Ministry of Defense has purchased a $30,000 systems simulating laboratory designed and made by Servo Corp. of America, New Hyde Park, N. Y. Lab has uses in development and synthesis of drone aircraft control systems, control and guidance systems for guided missiles and automatic airspeed and altitude controls.

Thailand, Vietnam and Laos will get a modern telecommunications system. The International Cooperation Administration signed with Hycon-Page of Wakefield, Mass., for engineering services.

England's Pye Ltd. claims to have shipped more than $700,000 worth of tv and other equipment to East Germany's Leipzig Fair. Communications gear, instruments, transistors, quartz crystals and sound-reproducing equipment were shown.

Canada has received first production model of CF-100 Flight and Weapons Systems Simulator from Canadian Aviation Electronics under electronics development contract let by Canadian government.

India has ordered a quantity of Marconi subminiature radio compasses for Indian Air Force fighter aircraft. Equipment weighs 22 pounds and can operate at 70,000 feet.

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WORK

The Laboratory is primarily engaged in the conception and perfection of completely automatic control systems necessary for the flight and guidance of aircraft, missiles and other vehicles.

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PLANTS and PEOPLE

FOUR FACTORS must be present if business is to prosper, Cohu tells WCEMA

FINANCIER urges business savvy

TECHNICAL manufacturing firms need to attach less weight to technical abilities, concentrate more on management organization, finance and sales, says LaMotte T. Cohu, president of Kay Lab. He told the Los Angeles section of the West Coast Electronic Manufacturers Association recently that companies which start with a particular product idea or the solution to a knotty technical problem "will not and cannot exist over a period of time without the other three factors."

Cohu, who got his introduction to the world of finance on Wall Street following World War I, grew up with the aircraft industry. He has served as president of Convair and TWA, and as board chairman of Northrop. Besides his job as president and board chairman of Kay Lab, he also serves on the boards of General Dynamics, Garrett, Eastern Industries and John Hancock Mfg.

Elaborating on the problems of small electronics manufacturers, Cohu listed five ways of financing:

- From earnings: this, he says, "is no longer feasible, for the tax laws do not allow for the necessary growth . . . in an industry that is developing as rapidly as electronics."
- Government financing: "red tape and controls that come with government money often limit the proper development of the company and put a real brake on its profit potential."
- From an "angel": most angels want two pounds of flesh."
- Public financing: "seems to be ideally suited to the needs of the electronics industry."
- Pooling of resources: "merging . . . can be effected in such a way as not to lose one's identity, and . . . combined with public financing, has distinct advantages."

The principal advantage of public financing, Cohu said, is that control of the company is not lost if the stock is properly distributed. Further, the stockholders themselves become salesmen for company products.

Business MEETINGS

Apr. 9-10: Conference on Electronics in Industry on the campus of Illinois Institute of Technology.

Apr. 22-24: Tax Problems and Management Development in International Operations: AMA seminars 9004-9005, Sheraton-Astor, New York.

MUNTZ quits

SOUTHERN California auto dealer Earl W. Muntz, who broke into the tv manufacturing field in 1948, has resigned the presidency of the firm that bears his name.

New general manager of Muntz Tv is Walter Poranski, president of tv cabinetmaking firm Poray Inc. Poranski says "when I get through with it, we'll be producing both monochrome and color sets," but didn't pick up Muntz's earlier estimate of 50,000 color sets for '57.

Muntz has "severed all management relations with the company," although he still owns a lot of stock.

ADMIRAL to centralize

PURPOSELY discarding the idea of decentralized facilities, Admiral will shortly break ground for a 150,000-sq ft addition to its Harvard, Ill., production plant. The planned expansion is the sixth in ten years for the Midwest setmaker, will bring the production-warehouse space to 422,000 sq ft, ten times the floor area Admiral occupied in 1947.

Admiral is centralizing its electronics production and storage facilities to take advantage of mixed shipments in quantity to Admiral

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AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it" — "they" being all the industry's front line of innovators and improvers—and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you — giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL PUBLICATIONS

dealers. Says president Ross Siragusa, "Television and appliance dealers . . . have been hard-pressed to remain competitive with the giant stores capable of purchasing carloads of any one type of tv receiver or appliance."

The company will move its tv production from Bloomington, Ind., to the Harvard plant, keep the Bloomington people busy making tuners, yokes, and other set parts.

TOP MAN in Topp sales: R. P. Gira

TOPP gets new sales manager

NEW general sales manager of Topp Industries is Robert P. Gira, formerly sales manager for the company's manufacturing division. Gira will direct all sales programs for the Los Angeles corporation, including the efforts of subsidiary companies Haller, Raymond & Brown and Heli-Coil Corp. He reports directly to Topp president B. F. Gira.

IT&T streamlines corporate lines

FIRST STEPS in a top-level realignment of corporate organization are being taken by International Telephone & Telegraph. The corporation aims to streamline its domestic research, manufacturing, sales and service activities and remove overlaps in jurisdiction.

IT&T first set up the job of vice-president for marketing, put former Federal Telephone & Radio president Raymond S. Perry in the slot. IT&T vice-president John E. Gingrich moves out to Clifton, N. J., to take over FTR.

The company also clipped a few responsibilities away from FTR. Telephone manufacturing will be sent out to Kellogg Switchboard & Supply, Chicago. Wire and cable manufacturing activities go up to Royal Electric in Pawtucket, R. I. A new industrial products department headed by FTR vice president Joseph A. Frabutt will take over some of the work in instruments, railroad signaling and control equipment that was formerly handled at FTR and elsewhere in IT&T.

Next step planned: the formation of a commercial products division to handle all of FTR's activities in that line. Federal will be left with the job of producing electronic equipment for the armed forces and other government departments.

Executive MOVES

GULTON INDUSTRIES, setting up a research and development group in industrial electronics at Albuquerque, N. W., hires **Burt J. Bittner** away from Sandia to head the new division.

Westinghouse is building a multimillion-dollar transformer plant in Athens, Ga., moves **Gordon C. Hurlbert** in to manage the new production facility. The company is also forming an x-ray and industrial electronics division with **W. J. Delaney Jr.** moving in from the motor and control division to take over.

General Instrument moves eastern sales manager **John K. McDonough** up to the job of v-p and general sales manager. Chicago salesman **Frederick W.**

Timmons also moves up to become a regional sales manager.

Teleregister Corp. hires management consultant **Thomas H. Cassons** as finance v-p.

CBS legal beagle **Thomas K. Fisher** moves into a newly created slot as v-p and general attorney for CBS-Tv.

Longtime IBM salesman **Theodore J. Weppner** moves up to become advertising-sales promotion director for IBM's data-processing division.

IBM buys Vermont plant

CONTINUING its countrywide expansion, IBM's data-processing division is now occupying a 40,000-sq ft plant near Burlington, Vt. The plant, on a 20-acre tract, is to be used for manufacture of computer subassemblies which will be shipped elsewhere for final assembly.

IBM has optioned some 250 acres of adjoining land for possible future expansions in Vermont.

The computer company is also adding a 100,000-sq ft engineering building to its Owego, N. Y., military products facility. New production capacity will be used for the USAF's Brane navigational system.

THOMPSON expands R&D

LONG-PULL expansion of research and development activities is now being undertaken by Cleveland manufacturer Thompson Products. First step was the acquisition of a 66,000-sq ft engineering building bought from Perfection Industries for $225,000.

Meanwhile, the company is building a $5-million R&D center near its Euclid Ave. headquarters in Cleveland. All research and engineering activities will ultimately be housed in this center, which will take shape over the next five years. First three buildings start going up next month.

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'Elbow room' cry REPS

LOOKING to a 10-15 percent increase in business this year, and feeling pretty good about it, manufacturers representatives all over the country are spreading into new quarters, building up larger sales staffs, adding lines.

Dallas rep **J. Y. Schoonmaker** is moving into a new 5,000-sq ft showroom and enlarging his staff. The 25-year-old company handles test gear, analyzing and recording systems, circuit components.

Cleveland's **Electro Sales Associates** is opening an additional sales office in Dayton with John Sheffs as manager.

Buffalo rep **R. W. Mitscher** has taken on the semiconductor product line of General Transistor for New York state outside the NYC area.

Bogen and Presto hi-fi components, sound and recording systems are now distributed through six new reps:

Handling the lines of both Unitronics subsidiaries: **Bush & Wharfield,** Denver and Salt Lake City, for the mountain states.

Handling Presto: **E. L. Berman,** San Francisco, for northern California; **Michael Scott,** Boston, for New England; **W. H. Ellinger,** Bogen rep in Chicago, for Illinois and eastern Wisconsin; **Northwestern Agencies,** Portland and Seattle, for the Pacific Northwest.

Handling Bogen: **Morris, Cunningham & Mitchell,** Indianapolis, for Indiana.

Other DISTRIBUTION news

GARRETT CORP.'s **Air Supply and Aero Engineering** divisions are now nationwide distributors for Mica Corp.'s epoxy glass laminates.

Grady Duckett, Atlanta, has taken on the component line of Philadelphia's Elco Corp.

In Detroit, **Louis H. Champagne** will cover Michigan's wholesale trade for Boston Woven Hose & Rubber's line of friction, rubber and plastic tapes.

Fanon Electric now sells its intercom line to the export trade through the **Roburn Agency,** N. Y.

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About our TECHNICAL edition . . .

(ALL ELECTRONICS subscribers receive two Business Editions and the Technical Edition each month.)

Single-tube circuit that provides an accurately spaced dual pulse chain for precision time measuring unit is described by David Kushner of Hazeltine Electronics in the April 1 issue of ELECTRONICS. Adjustable spacing between pulses is provided over a range from 0 to 10,000 microseconds.

Design aids that simplify the cut-and-try manipulations of circuit constants, core type, core size and wire size for transistor audio coupling transformers are provided by C. J. and C. A. Savant of Servomechanisms, Inc. in our March 1 issue.

Simple signal discriminator can be connected to any a-m radio receiver to silence broadcast talk in any language and transmit nothing but music. Full details are given by Ronald L. Ives in our April 1 issue. Adjustable controls admit or suppress speech signals.

Tetrode transistor is used as a 52-mc oscillator for transmitting and as a superregenerative detector for receiving in transceiver designed by W. F. Chow of GE and appearing in our April 1 issue.

One power transistor operating as switch provides efficient deflection of a cathode-ray-tube beam for television receiver horizontal-sweep applications. Sweep amplitude may be adjusted continuously if need be. See article in our April 1 issue by Walter B. Guggi of Stanford Research Institute.

Five-hundred-watt sound system is dropped from airplane to deliver prerecorded message, according to Fischer, Gerlach and Schover of Cook Research Labs., in our March 1 issue. Sound "bomb" includes 500-w amplifier.

THE EDITORS

electronics READER SERVICE CARD

FOR ADDITIONAL INFORMATION ON ADVERTISEMENTS AND NEW PRODUCTS

Here is How to Use the Card!

WANT MORE INFORMATION ON ADVERTISEMENTS?

For more information on an advertisement, circle page number of advertisement in section A on the reader service card (below).

If there is more than one advertisement on the page, the position of the ad will be indicated by letters following the page number. The letters following the page number will indicate the ad's positions: R-Right, RT-Right Top, RB-Right Bottom, L-Left, LT-Left Top, LB-Left Bottom, M-Middle, MT-Middle Top, MB-Middle Bottom (i.e. 230L). Diagrams on back of this page show how to use the key.

On pages with no number such as bleed pages, count from the last numbered page to find the number. Inserts are numbered using last numbered page plus A, B, etc. If you are not sure of a page number, consult the advertisers index.

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Each New Product item in ELECTRONICS has a number (P1, P2, etc.) Circle the corresponding number in section B of the Reader Service Card (below).

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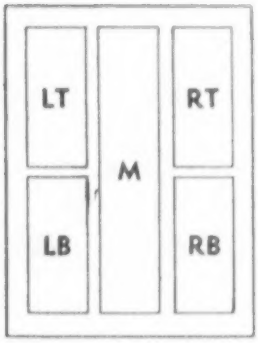
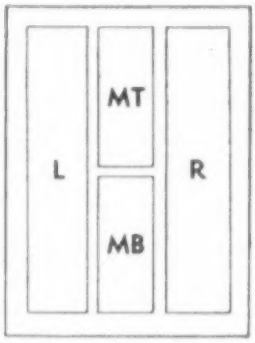
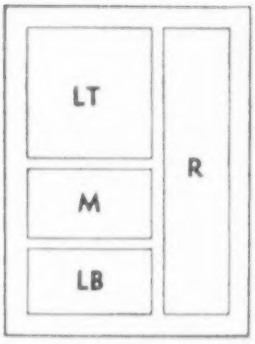
P1	P6	P11	P16	P21	P26	P31	P36	P41	P46	P51	P56	P61	P66	P71	P76	P81	P86	P91	P96
P2	P7	P12	P17	P22	P27	P32	P37	P42	P47	P52	P57	P62	P67	P72	P77	P82	P87	P92	P97
P3	P8	P13	P18	P23	P28	P33	P38	P43	P48	P53	P58	P63	P68	P73	P78	P83	P88	P93	P98
P4	P9	P14	P19	P24	P29	P34	P39	P44	P49	P54	P59	P64	P69	P74	P79	P84	P89	P94	P99
P5	P10	P15	P20	P25	P30	P35	P40	P45	P50	P55	P60	P65	P70	P75	P80	P85	P90	P95	P100

DIAGRAMS BELOW SHOW HOW TO USE THE KEY

ON PAGES WITH MORE THAN ONE ADVERTISEMENT







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USE THIS KEY:

R—Right

RT—Right Top

RB—Right Bottom

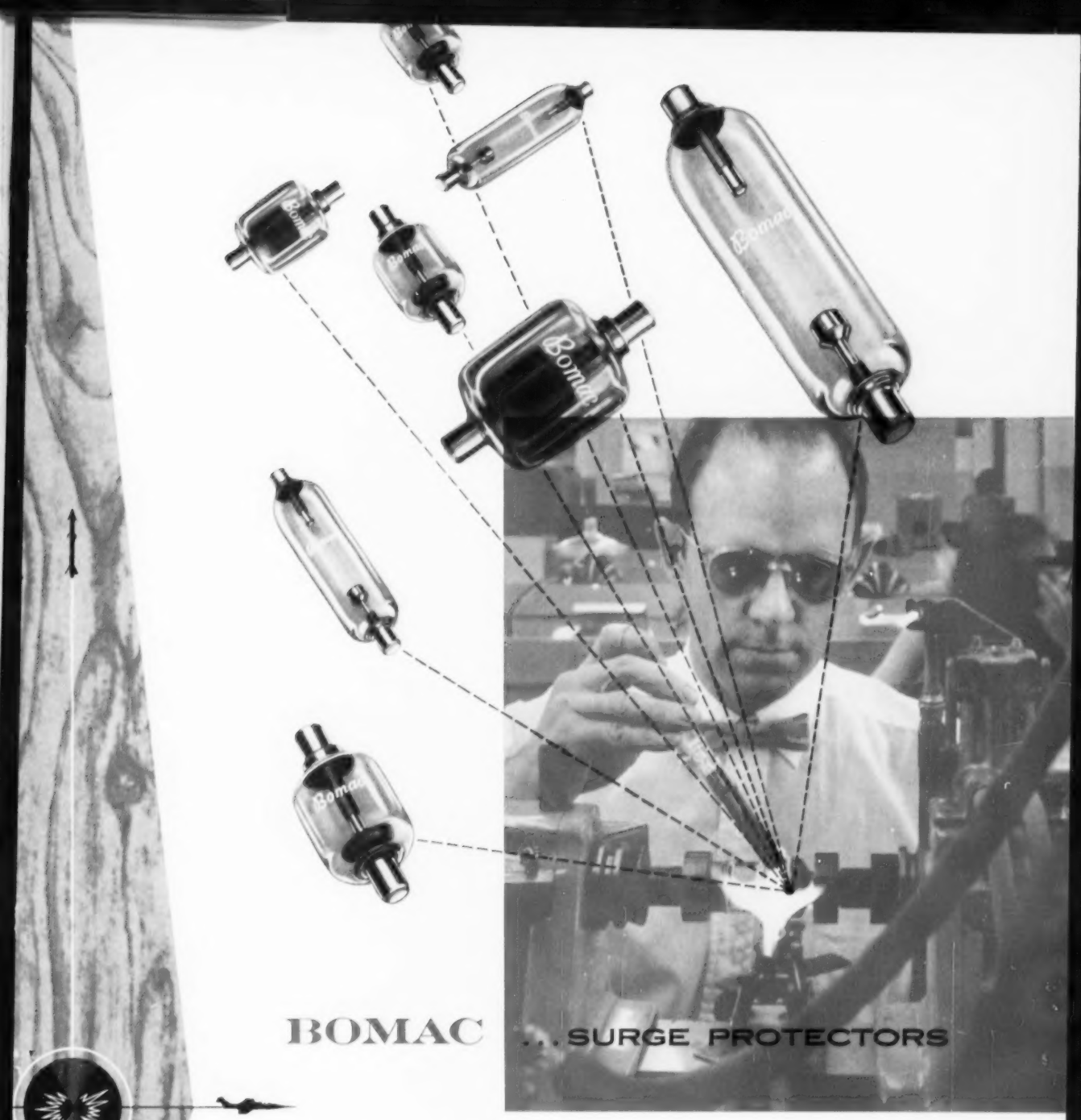
L—Left

LT—Left Top

LB—Left Bottom

M—Middle

MT—Middle Top



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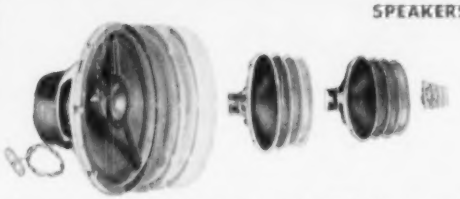

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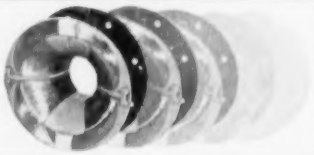

RCA Electronic Components are produced from select raw materials, manufactured under rigid standards of quality control. Include deflection yokes, horizontal output and high-voltage transformers and other accessory items for black and white and color TV (direct view and projection); cameras, image Orthicon and Vidicon, and special types for radar. *Design around RCA dependability!*

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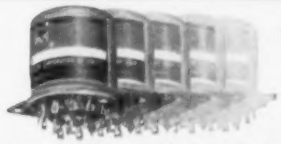

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